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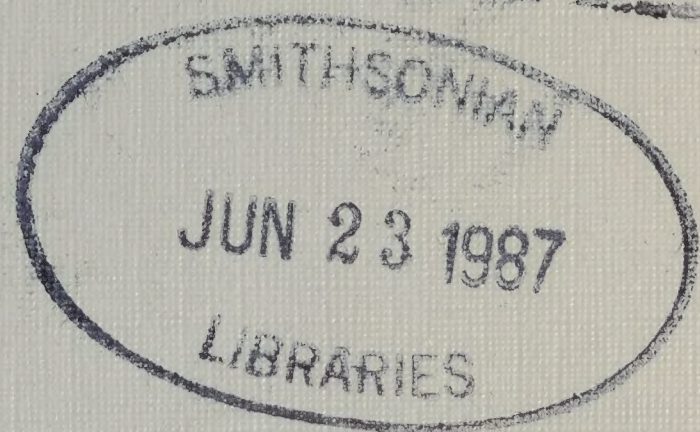
# FLORA OF SOUTHERN AFRICA

PTERIDOPHYTA

Editor O. A. Leistner



by E. A. C. L. E. Schelpe and Nicola C. Anthony



Botanical Research Institute  
Department of Agriculture and Water Supply  
Republic of South Africa



# FLORA OF SOUTHERN AFRICA

All contributions should be compiled in accordance with the Guide to Contributors to the Flora of Southern Africa (compiled by Ross, Leistner & De Winter) which is available from the Librarian, Botanical Research Institute, Private Bag X101, Pretoria, 0001.

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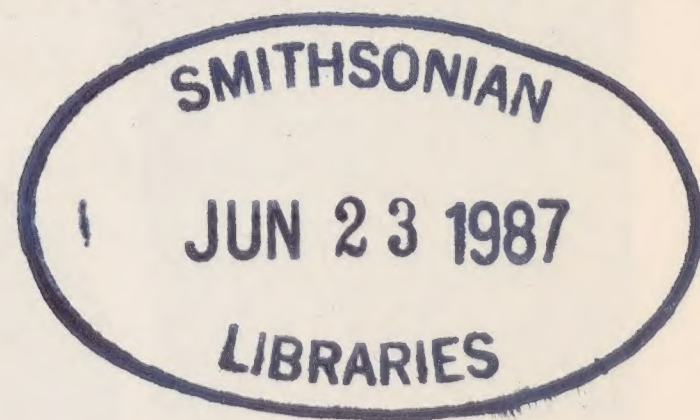
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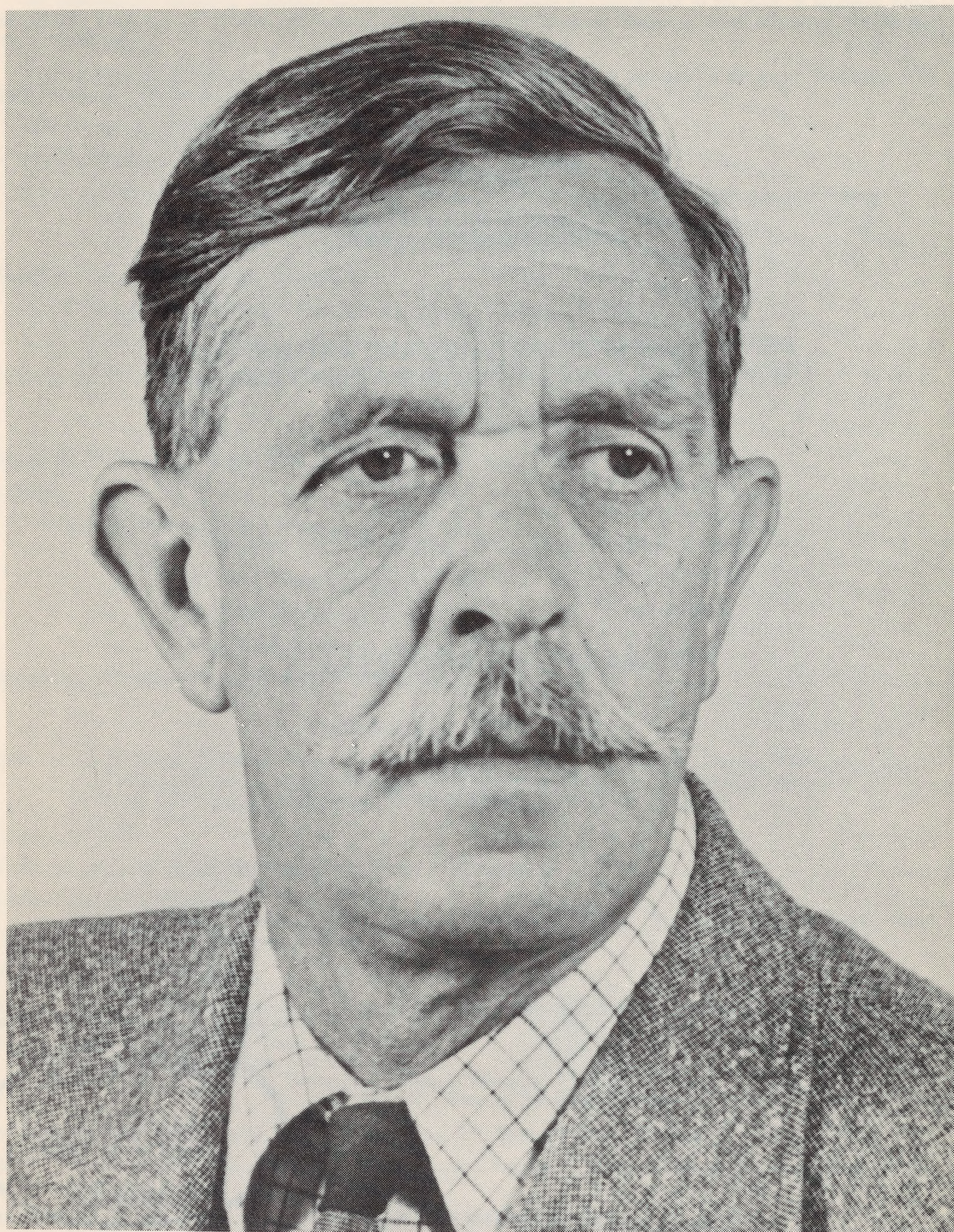
PTERIDOPHYTA

ISBN 0 621 08877 3



G.P.-S. 021-9000





**Edmund André Charles Louis Eloi Schelpe**

27 July 1924–12 October 1985

Ecologist, taxonomist, phytogeographer, plant collector—  
searcher with inspiring enthusiasm.



# **FLORA OF SOUTHERN AFRICA**

which deals with the territories of

**SOUTH AFRICA, Ciskei, TRANSKEI, LESOTHO, SWAZILAND, BOPHUTHATSWANA,  
SOUTH WEST AFRICA/NAMIBIA, BOTSWANA AND VENDA**

## **PTERIDOPHYTA**

by

**E.A.C.L.E. Schelpe and Nicola C. Anthony**

**University of Cape Town**

Edited by

**O. A. Leistner**

**Editorial Committee: B. de Winter, D. J. B. Killick and O. A. Leistner**

**Botanical Research Institute,  
Department of Agriculture and Water Supply**

**1986**







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## INTRODUCTION

The first comprehensive treatment of the Pteridophyta of Southern Africa was the first edition (1892) of T. R. Sim's *The Ferns of South Africa*. The arrangement and nomenclature was largely based on the second edition (1874) of Hooker and Baker's *Synopsis Filicum*. In 1915 Sim produced the second edition of his work which follows Christensen's *Index Filicum* (1906) and its *Supplementum* (1913).

Over the past thirty years the senior author has travelled widely in this region in the course of field work on this group. On overseas visits the type specimens of species occurring in this area have been searched for and examined as far as possible. Most of the genera have been studied on a pan-African basis as a necessary background to the present treatment which led also to the publication of the pteridophyte volumes of the *Flora Zambesiaca* (1970), *Conspectus Florae Angolensis* (1977), *Flora de Moçambique* (1979) and taxonomic reviews of a number of fern families in continental Africa.

Although a number of more recent classifications of the ferns have been proposed and a number of genera redefined, the arrangement in this treatment follows that in the above works for the sake of compatibility. Generic and species concepts are mostly construed in the wide sense either for convenience or so as not to obscure phytogeographic relationships. However, a number of these aggregate species and genera require cytotaxonomic study for their elucidation.

The following condensed abbreviations for literature are used:

C.F.A. ....	Conspectus Florae Angolensis
F.S.W.A. ....	Prodromus einer Flora von Südwestafrika
F.W.T.A. ....	Flora of West Tropical Africa
F.Z. ....	Flora Zambesiaca

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The initial research overseas was undertaken during the tenure of a Nuffield Travelling Fellowship in the Natural Sciences; later overseas study visits were supported by grants from the CSIR and the Bremner Fund of the University of Cape Town. The authors also wish to thank the curators and directors of the following herbaria for making their facilities available, sending herbarium material on loan or providing photographs and photostats of specimens: B, BLFU, BM, C, E, G, GOET, GRA, K, LD, NBG, NH, NPB, NU, P, PRE, PRU, SAM, S, SRGH, STE, UPS, WIND, Z. The work was brought to completion with the invaluable help of my research assistant, Mrs Nicola C. Anthony, whose post was funded jointly by the then Department of Agriculture and Fisheries and the University of Cape Town.

E. A. C. L. E. Schelpe, 1985.

Roux, J. P. in *Botanical Journal of the Linnean Society* 92: 343—381 (1986) could not be taken into account. It appeared when this volume was in the last stages of preparation.—Editor.



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Vol. 11: *Phytolaccaceae, Aizoaceae, Mesembryanthemaceae*

Vol. 12: *Portulacaceae, Basellaceae, Caryophyllaceae, Illecebraceae, Cabombaceae, Nymphaeaceae, Ceratophyllaceae, Ranunculaceae, Menispermaceae, Annonaceae, Trimeniaceae, Lauraceae, Hernandiaceae, Papaveraceae, Fumariaceae*



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Part 2: *Vernonieae, Cardueae*  
Part 3: *Arctotideae*  
Part 4: *Anthemideae*  
Part 5: *Astereae*  
Part 6: *Calenduleae*  
Part 7: *Inuleae: Fascicle 1: Inulinae*  
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Part 8: *Heliantheae, Eupatorieae*  
Part 9: *Senecioneae*



# LIST OF ORDERS, FAMILIES AND GENERA

## PSILOTALES

### PSILOTACEAE

Psilotum

Anemia

Mohria

Lygodium

## LYCOPODIALES

### LYCOPODIACEAE

Lycopodium

### MARSILEACEAE

Marsilea

### SALVINIACEAE

Salvinia

## SELAGINELLALES

### SELAGINELLACEAE

Selaginella

### AZOLLACEAE

Azolla

## ISOETALES

### ISOETACEAE

Isoetes

### CYATHEACEAE

Cyathea

## EQUISETALES

### EQUISETACEAE

Equisetum

### HYMENOPHYLLACEAE

Trichomanes

Hymenophyllum

## OPHIOGLOSSALES

### OPHIOGLOSSACEAE

Ophioglossum

### DENNSTAEDTIACEAE

Blotiella

Histiopteris

Pteridium

Microlepia

Hypolepis

## MARATTIALES

### MARATTIACEAE

Marattia

### VITTARIACEAE

Vittaria

## FILICALES

### OSMUNDACEAE

Osmunda

Todea

### ADIANTACEAE/PTERIDACEAE

Acrostichum

Anogramma

Ceratopteris

Pityrogramma

Adiantum

Pteris

Cheilanthes

### GLEICHENIACEAE

Gleichenia

Dicranopteris

### SCHIZAEACEAE

Schizaea



Pellaea  
Actiniopteris  
  
LINDSAEACEAE  
Lindsaea  
  
GRAMMITIDACEAE  
Grammitis  
Xiphopteris  
  
POLYPODIACEAE  
Pyrrosia  
Loxogramme  
Polypodium  
X Pleopodium  
Pleopeltis  
Microgramma  
Microsorium  
  
DAVALLIACEAE  
Nephrolepis  
Arthropteris  
Oleandra  
Davallia  
  
ASPLENIACEAE  
Asplenium  
Ceterach  
  
THELYPTERIDACEAE  
Thelypteris

Macrothelypteris  
Ampelopteris  
  
ATHYRIACEAE  
Athyrium  
Lunathyrium  
Diplazium  
Dryoathyrium  
Cystopteris  
  
LOMARIOPSIDACEAE  
Elaphoglossum  
Bolbitis  
  
ASPIDIACEAE/DRYOPTERIDACEAE  
Woodsia  
Didymochlaena  
Dryopteris  
Cyrtomium  
Polystichum  
Arachniodes  
Rumohra  
Hypodematum  
Ctenitis  
Tectaria  
  
BLECHNACEAE  
Blechnum  
Stenochlaena



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# GLOSSARY

Most of the terms used in this work correspond largely to Tryon's proposals in *Taxon* 9: 104–109 (1960). However, since the present authors' concept of certain terms differs to a minor extent it is necessary that these differences be made clear. Some terms are illustrated in tab. 1.

**acroscopic**, on the side towards the apex

**acrostichoid**, with the sporangia spread over the lower surface of the fertile lamina (as in *Acrostichum* and *Elaphoglossum*)

**anastomosing** (of veins), uniting so as to form a network

**annulus**, the hygroscopic, thickened cells causing the dehiscence of the sporangium

**antheridium**, male sexual organ borne on the gametophyte

**areole**, space enclosed by anastomosing veins

**basipetal**, arising and maturing in succession from apex to base, e.g. sporangia in (Hymenophyllaceae)

**basisopic**, on the side towards the base

**biscotiform**, biscuit-shaped, i.e. oblong and slightly constricted in the middle

**caudex**, stem surrounded by leaf-bases and adventitious roots, as in arborescent ferns (e.g. *Cyathea*)

**clathrate**, of rhizome and other scales, with a latticed appearance, due to the cells having thickened lateral walls and transparent surface walls

**costa**, the midrib of the pinna

**costule**, the midrib of a pinnule or pinna segment

**cristo-reticulate**, crests anastomosing to form a network

**cultrate**, shaped like the blade of a knife

**dictyostelic**, (trunk) with vascular bundles concentrically arranged with large overlapping leaf gaps

**dimidiate**, of pinnae or pinnules in which the midrib forms the basisopic margin for a significant distance

**distal**, away from the place of attachment

**dorsal**, synonymous with abaxial or lower in regard to lamina surfaces

**ebeneous**, black as ebony

**echinate**, spinose, with projections tapering from a broad base to a  $\pm$  sharp apex

**evanescent**, soon disappearing

**exindusiate**, without an indusium

**gametophyte**, generation producing sexual organs

**gemma**, an adventitious bud arising on the frond which can produce a new plant

**glochidium**, barbed hair on massula (of *Azolla* spp.)

**granulate**, with more or less isodiametric projections not less than  $1\ \mu$

**heterosporous**, producing spores of 2 sizes, the larger giving rise to a female megagametophyte, the smaller giving rise to a male microgametophyte

**homosporous**, producing spores of the same size

**indusiate**, possessing an indusium

**indusium**, a thin flap of tissue covering at least the young sorus; pseudindusia are formed by modification of the lamina margin

**laesura**, the dehiscence fissure of a spore and its margin

**lamina**, the blade of a frond

**ligule**, a small membranous triangular organ on the adaxial side of the fertile leaf base in *Isoetes*

**lophate**, ridged with simple flange-like ridges, seldom much shorter than the shortest diameter of the spore

**mammillate**, having small nipple-like projections

**massula**, hardened, frothy, mucilaginous mass in which microspores (of *Azolla* spp.) are embedded

**megagametophyte**, the female gametophyte produced by the megaspore which bears the female sex organs

**megaspore**, in heterosporous pteridophytes the large spore which gives rise to the female gametophyte

**megasporangium**, the sporangium containing megaspores

**microgametophyte**, the male gametophyte produced by the microspore

**microspore**, the small spore which gives rise to the male gametophyte in heterosporous pteridophytes

**microsporangium**, the sporangium containing microspores

**midrib**, the main vascular supply of a simple lamina

**monolet**, with the dehiscence line unbranched (as in bilateral spores)

**nitid**, shining, smooth

**paleaceous**, set with scales

**paraphyses**, sterile hairs, sometimes clavate or with an enlarged apical cell, occurring among sporangia in a sorus

**perispore**, a layer outside the exine in certain spores

**petiolule**, stalk of a leaflet

**phyllopodium**, a leaf regarded morphologically as an axis

**pinna**, the first order division of a dissected lamina

**pinnate** (2–3–4-pinnate), indicating the degree of dissection of the lamina (see diagram) by incisions to the costae of the penultimate segments

**pinnatifid** (2–3–4-pinnatifid), indicating the degree of dissection of the lamina (see diagram) by incisions not reaching the costae of the penultimate segments

**pinnule**, the first order segment of a pinna

**prothallus**, small plant resulting from the germination of a spore and bearing sexual organs

**proximal**, towards the place of attachment

**pseudo-serrate**, referring to margins of rhizome scales which are apparently serrate because of the transparent unthickened outer walls of the marginal cells

**punctulate**, minutely dotted

**raphe**, ridge of tissue connecting sporocarp with base of pedicel

**rhachis**, main axis or midrib of a frond

**rhizomorph**, root-like structure

**scabrate**, flecked with minute pits and elevations

**secondary rhachis**, the costa of a pinnate or more dissected pinna



**solenostelic**, (trunk) with a tube-like vascular strand

**sporangium**, structure containing spores

**sporocarp**, an organ enclosing the sorus or sori in heterosporous ferns, hardened in *Marsilea*, membranous in *Azolla* and *Salvinia*

**sporophyll**, a leaf bearing or subtending sporangia in the Lycopodiales, Selaginellales, Psilotales and Isoetales

**sporangiophore**, a peltate organ bearing sporangia on its under surface in *Equisetum*

**stipe**, the petiole of a frond

**strobilus**, a cone-like structure formed from sporophylls or sporangiophores

**sulcate**, grooved

**synangium**, a group of more or less fused sporangia as in the Marattiales

**thalloid**, resembling a thallus

**thallus**, vegetative body not differentiated into stem and leaf

**trigonous**, three-angled with three plane faces

**trilete**, possessing a 3-radiate dehiscence scar

**vein** (*veinlet*), the obvious ultimate vascular strands of the ultimate segments of the lamina

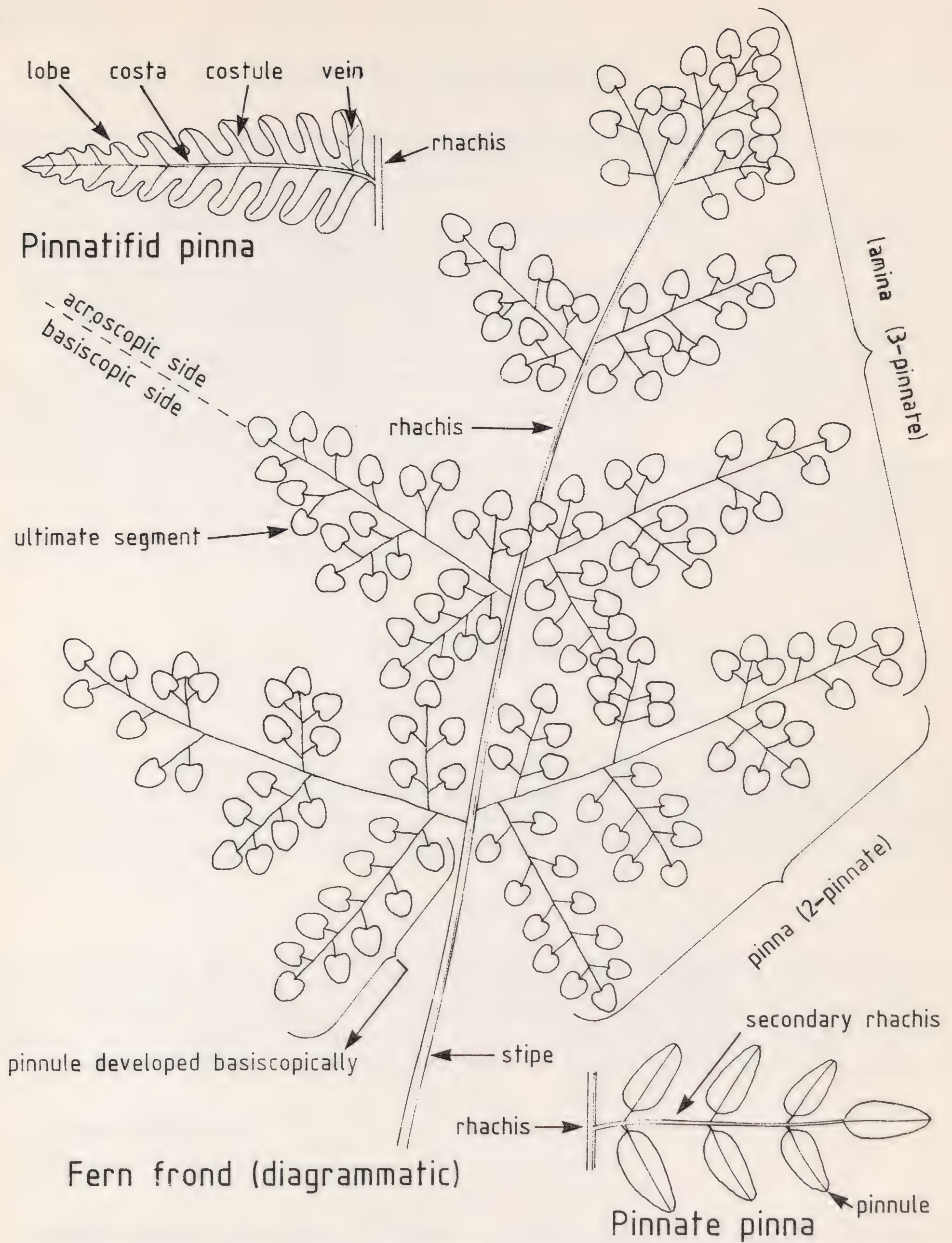
**velum**, membranous tissue covering sporangia (particularly in *Isoetes*)

**ventral**, synonymous with adaxial or upper in regard to the lamina surface

**verruca**, wart-like projection broader than tall

**verrucate**, with wart-like projections broader than tall





TAB. 1.—Illustration of terms in the glossary (after F.Z. Pteridophyta, tab. 1, with permission of the Managing Committee).







## KEY TO THE ORDERS

- 1a Leaves all narrow and simple, entire (usually small) with unbranched veins; sporophylls either with a sporangium at base or subtending a sporangium or with sporangia borne within a cone-like structure:
  - 2a Sporangia borne in axils of the sporophylls or on their bases:
    - 3a Plants homosporous; leaves without ligules:
      - 4a Sporangia 3-lobed; stems leafless except for minute much reduced sporophylls ..... PSILOTALES (p. 1)
      - 4b Sporangia not lobed; stems with numerous leaves ..... LYCOPODIALES (p. 5)
    - 3b Plants heterosporous; leaves with ligules:
      - 5a Plants aquatic, wholly or partly submerged during wet season, sedge-like; sporangia borne on leaf bases; stem a short, lobed rootstock ..... ISOETALES (p. 23)
      - 5b Plants not aquatic, often moss-like with elongated erect or creeping stems; sporangia borne in axils of differentiated sporophylls ..... SELAGINELLALES (p. 15)
  - 2b Sporangia borne on peltate sporangiophores arranged in a cone-like structure; leaves reduced to a short, toothed sheath at each node ..... EQUISETALES (p. 29)
- 1b Leaves usually broad, simple or dissected, lamina with a branched vascular supply:
  - 6a Sporangia thick-walled, without an annulus; homosporous:
    - 7a Sporangia borne in 2 rows on a distinct slender fertile segment; sterile lamina entire (or lobed) ..... OPHIOGLOSSALES (p. 31)
    - 7b Sporangia fused in small groups on under surface on undifferentiated lamina segments ..... MARATTIALES (p. 37)
  - 6b Sporangia thin-walled, with an annulus; homosporous or heterosporous ..... FILICALES (p. 39)

## PSILOTALES

## PSILOTACEAE

Epiphytic or saxicolous plants. *Aerial stems* chlorophyllous, repeatedly dichotomously branched, produced from non-chlorophyllous mycorrhizal rootless rhizome-like horizontal axes; *leaves* much reduced. *Sporangia* 3-locular, each subtended by a bifurcate bract and borne on upper parts of aerial branches. *Spores* bilateral, produced in tetrads. *Gametophyte* cylindrical, irregularly branched, mycorrhizal.

## PSILOTUM

**Psilotum** Swartz in J. Bot., Gött. 1800, 2: 8, 109 (1801); Engl., Pflanzenw. Afr. 2: 76 (1908); Tardieu-Blot in Mém. Inst. fr. Afr. noire 50: 45 (1957); Alston in F.W.T.A. edn 2, Suppl. 17 (1959); Tardieu-Blot in Fl. Gabon 8: 26 (1964); Schelpe in F. Z. Pterid.: 15 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 9 (1973); in C. F. A. Pterid.: 17 (1977). Lectotype species: *P. triquetrum* Swartz, nom. illeg. (= *Lycopodium nudum* L.; *P. nudum* (L.) Beauv.).

Description as for family.

Only one of the 3 species of the genus *Psilotum* occurs in Southern Africa.

**Psilotum nudum** (L.) Beauv., Prodr. L'Aethéog. 106, 112 (1805); Schelpe in F. Z. Pterid.: 15, t. 2 (1970); in C. F. A. Pterid.: 17, t. 2 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 130 (1983). Type: India (LINN 1257/1, holo.!).

*Lycopodium nudum* L., Sp. Pl. 2: 1100 (1753).

*Psilotum triquetrum* Swartz in J. Bot., Gött. 1800, 2: 109 (1801); Sim, Ferns S. Afr. edn 2: 342, t. 181 fig. 2 (1915), nom. illeg.

*Bernhardia capensis* K. Muell. in Bot. Ztg 1858: 239 (1858). Type: Natal, *Pappe* s.n. (?KR, holo.).

Rhizome short rootless, c. 1,5 mm in diameter. *Aerial stems* triangular in cross-section, glabrous, up to 240 × 2 mm, with widely spaced lanceolate scale-leaves up to 1,5 mm long. *Sporangia* c. 2,5 mm in diameter, each subtended by a bifurcate bract c. 1,3 mm long. Fig. 1: 1.



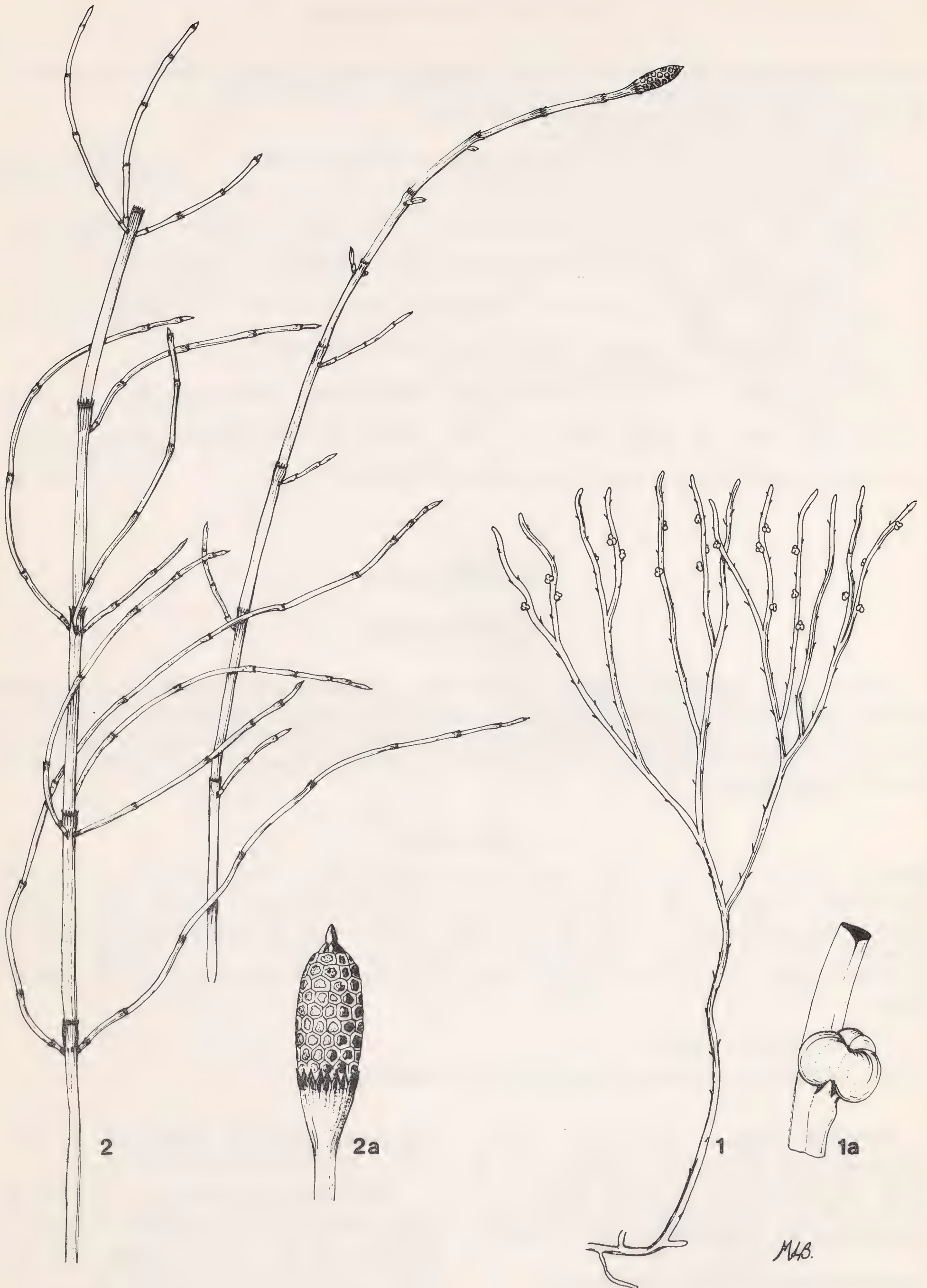
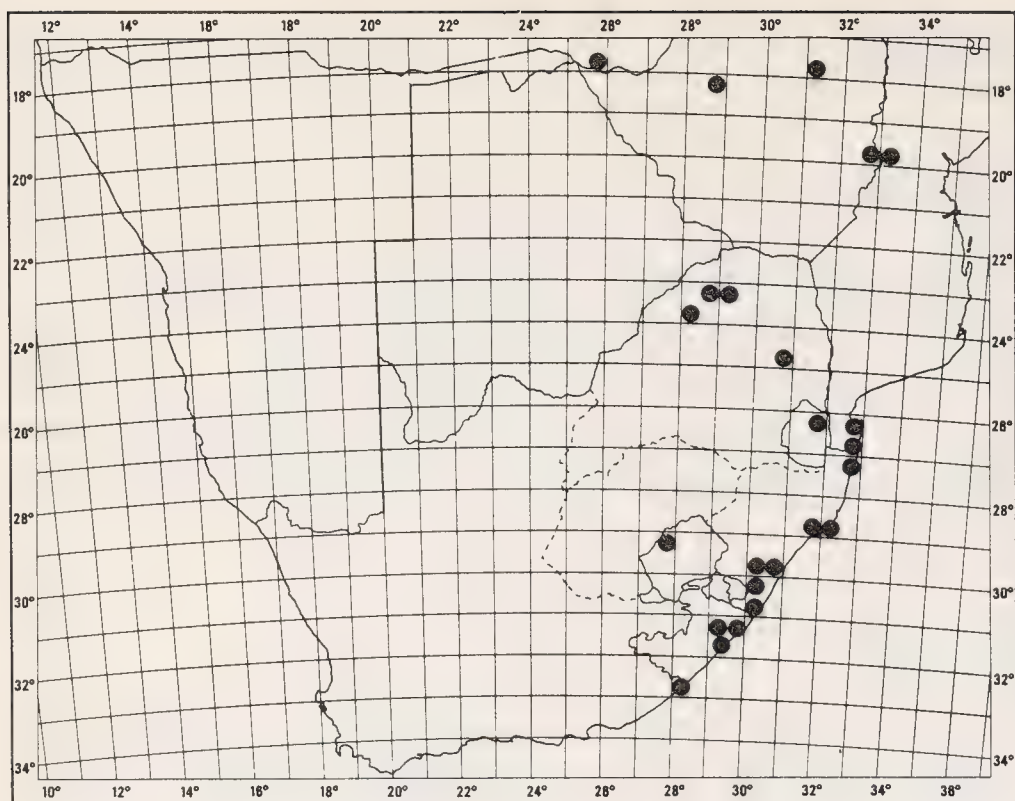


FIG. 1.—1, *Psilotum nudum*, part of plant,  $\times 0,6$ ; 1a, sporangium,  $\times 6$  (Wild 6601). 2, *Equisetum ramosissimum*, part of plant,  $\times 0,6$ ; 2a, strobilus,  $\times 3$  (Sim s.n.).



MAP 1.—*Psilotum nudum*

Transkei, Natal, Lesotho, Swaziland, Transvaal, Zimbabwe, Mozambique, Zambia, Angola, Zaire, Tanzania, Kenya, Uganda, Gabon, Cameroun and Nigeria, as well as Madagascar, Mauritius, Réunion, Rodrigues, Seychelles and Comoro Islands, Chagos Archipelago, Asia, Polynesia, Australasia, the Americas and Spain. In sheltered moist sandstone crevices from sea level in Transkei to between 910 and 1 900 m altitude in tropical Africa, where it may also be epiphytic. Map 1.

Vouchers: *Dyer* 4505 (PRE); *Schelpe* 5029 (B; BOL; GH; K; M; MO; P; PRE; S; US); *Ward* 1158 (BM; NH; NU).







## LYCOPODIALES

## LYCOPODIACEAE

Epiphytic, lithophytic or terrestrial plants. *Stems* erect, pendulous or prostrate, unbranched or dichotomously branched. *Leaves* small, simple with a single vein, without ligules. *Sporophylls* uniform, usually restricted to distinct or indistinct fertile regions (distinct compact fertile regions referred to as strobili). *Sporangia* borne in axils of sporophylls, solitary, unilocular, reniform to globose, homosporous. *Gametophytes* chlorophyllose or mycorrhizal and colourless.

## LYCOPODIUM

**Lycopodium** L., Sp. Pl. 1100 (1753); Gen. Pl. edn 5: 486 (1754); Engl., Pflanzenw. Afr. 2: 70 (1908); Alston in Mém. Inst. fr. Afr. noire 50: 20 (1957); in F.W.T.A. edn 2, Suppl. 11 (1959); Tardieu-Blot in Fl. Gabon 8: 8 (1964); in Fl. Camer. 3: 9 (1964); Schelpe in F.Z. Pterid.: 17 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 11 (1973); in C.F.A. Pterid.: 19 (1977). Lectotype species: *L. clavatum* L.

## Description as for family.

The only living genus of the family, with a worldwide distribution and comprising over 450 species. This estimate includes those species which do not form distinct strobili and which Herter (1939) referred to the genus *Urostachys*.

## 1a Sporophylls of same size and shape as foliage leaves:

- 2a Leaves narrowly lanceolate, c. 2 mm broad; spore-bearing stems erect, unbranched ..... 1. *L. saururus*  
 2b Leaves acicular, c. 0.2 mm broad; spore-bearing stems pendent, dichotomously branched ..... 2. *L. verticillatum*

## 1b Sporophylls different from foliage leaves:

## 3a Sporophylls not grouped into pedunculate strobili (i.e. without a sparsely leafy stalk below fertile region):

- 4a Sporophylls 6, 5–7 mm long ..... 3. *L. dacrydioides*  
 4b Sporophylls less than 4 mm long:

## 5a Fertile region more than 20 mm long; sporophylls not lacerate; plants epiphytic or lithophytic:

- 6a Sporophylls 2, 5–3 mm long; leaves coriaceous, closely imbricate ..... 4. *L. gnidioides*  
 6b Sporophylls c. 2 mm long; leaves thin, very loosely imbricate ..... 5. *L. ophioglossoides*

5b Fertile region less than 15 mm long; sporophylls lacerate; plants terrestrial..... 6. *L. cernuum*

## 3b Sporophylls grouped into pedunculate strobili; plants terrestrial:

## 7a Horizontal stem producing much branched erect stems at intervals:

- 8a Leaves hair-pointed; erect stems not laterally compressed ..... 7. *L. clavatum*  
 8b Leaves not hair-pointed; erect stems laterally compressed ..... 8. *L. complanatum* subsp. *zanclophyllum*

7b Horizontal stem leafy, only producing pedunculate strobili at intervals ..... 9. *L. carolinianum*

1. **Lycopodium saururus** Lam., Encycl. 3: 653 (1789); Sim, Ferns S. Afr. edn 2: 324, t. 175 (1915); Schelpe in F.Z. Pterid.: 17 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 132, t. 74 (1983). Type: Réunion, Commerson s.n., Herb. Lamarck (P, holo.!–BOL, photo!).

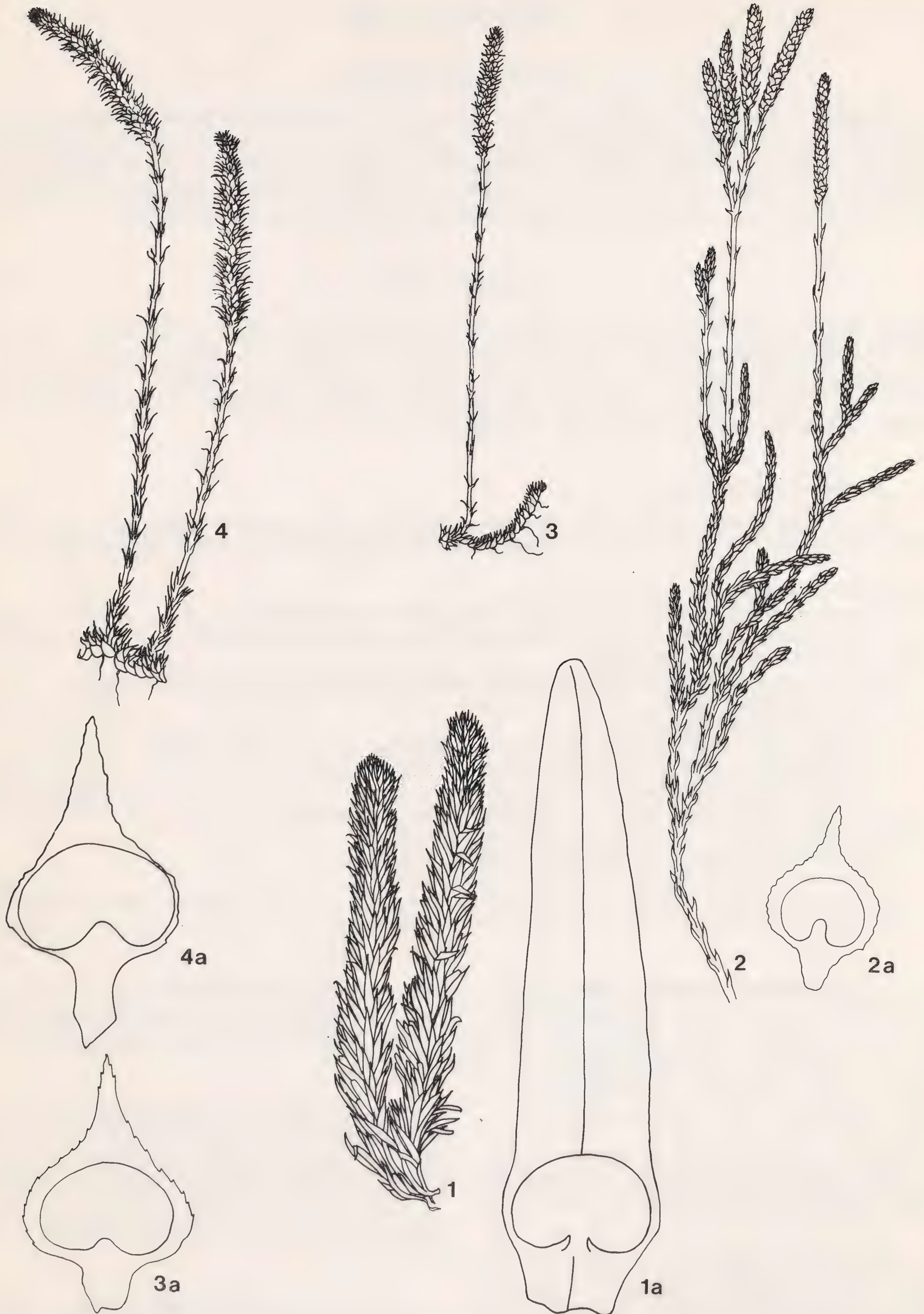
*Plananthus saururus* (Lam.) Beauv., Prodr. L'Aethéog. 100 (1805). *Urostachys saururus* (Lam.) Herter in Feddes Repert. 19: 162 (1923). *Huperzia saururus* (Lam.) Rothm. in Feddes Repert. 54: 60 (1944).

Terrestrial or lithophytic. *Aerial stems* produced from compact branching horizontal stems, usually unbranched, erect, crowded, up to 200 × 3 mm. *Leaves* erect, closely imbricate, narrowly oblong-lanceolate, c. 10 × 2 mm. *Sporophylls* indistinguishable from foliage leaves, 8–10 × 1.8–2 mm; sporangia hidden. Fig. 2: 1.

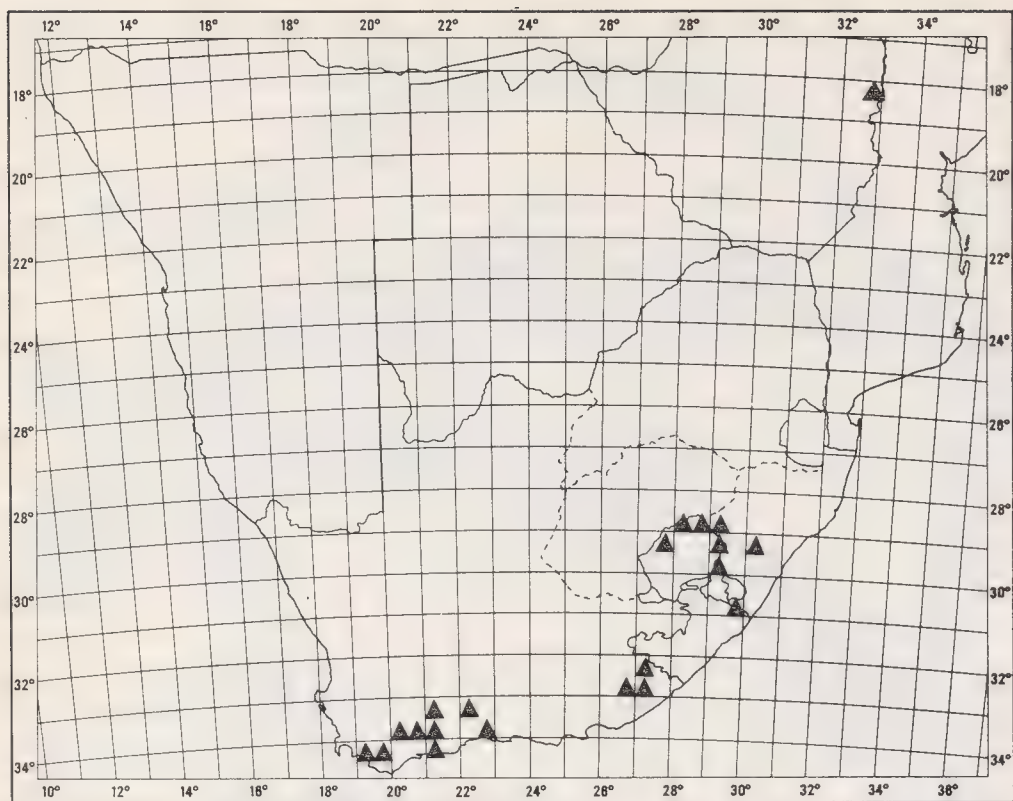
Cape Province, Natal, Lesotho, north-eastern Orange Free State, Zimbabwe, Malawi, Zaire, Tanzania, Kenya, Uganda, Ethiopia and Cameroun, as well as Madagascar, Marion Island, Gough Island, Tristan da Cunha, Nightingale Island, St Helena, Kerguelen Island, the South American Andes to Argentina (Christensen 1932) and Juan Fernandez. Rocky substrates in montane vegetation, above 1 700 m. Map 2.

Vouchers: Dieterlen 719 (K; NH; PRE; SAM); Pocock S. 150 (BOL; PRE; STE); Ripley 1 (BM; K; NU); Rourke 305 (NBG).







MAP 2.—*Lycopodium saururus*

2. *Lycopodium verticillatum* L. f., Suppl. 448 (1781); Sim, Ferns S. Afr. edn 2: 325, t. 178 (1915); Schelpe in F.Z. Pterid.: 17 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 133, t. 75 (1983). Type: Réunion, *Sonnerat* s.n. (SBT, holo.!).

*Urostachys verticillatus* (L. f.) Herter ex Nessel, Bär-lappgew. 121 (1939). *Huperzia verticillata* (L. f.) Rothm. in Feddes Repert. 54: 60 (1944).

Epiphytic or lithophytic. *Stems* pendulous, repeatedly dichotomously branched, up to 500 × c. 10 mm. *Leaves* acicular, suberect, mem-

branous, loosely imbricate. *Sporophylls* almost indistinguishable from foliage leaves, c. 5 × 0,2 mm; sporangia usually evident. Fig. 4: 2.

Eastern Cape Province, Transkei, Natal, Lesotho, north-eastern Orange Free State, Swaziland, Transvaal, Zimbabwe, Mozambique and Malawi, as well as Madagascar, the Comoro and Mascarene Islands, Fernando Po and tropical America. Montane forest in shade, usually above 1 750 m. Map 3.

Vouchers: *Compton* 26058 (NBG); *Fisher* 974 (NH; NU; PRE); *Rudatis* 605/830 (STE); *Sim* s.n. (BOL; PRE).

3. *Lycopodium dacrydioides* Bak., Fern Allies 17 (1887); Sim, Ferns S. Afr. edn 2: 327, t. 176 (1915); Schelpe in F.Z. Pterid.: 18 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 134, t. 76 (1983). Type: Transvaal, Woodbush, *Rehmann* 5579 (K, lecto.!).

*Urostachys dacrydioides* (Bak.) Herter ex Nessel, Bär-lappgew. 188 (1939).

Epiphytic or infrequently lithophytic. *Stems* pendulous, dichotomously branched, up to 900 × 3 mm. *Leaves* suberect, loosely imbricate, subulate, 15–18 × 1, 5–2 mm at the base. *Sporophylls* narrowly oblong-lanceolate, imbricate, 6,5–7 × c. 2 mm. Fig. 3: 3.

A predominantly tropical African species, its distribution range extending from Sudan and Cameroun through

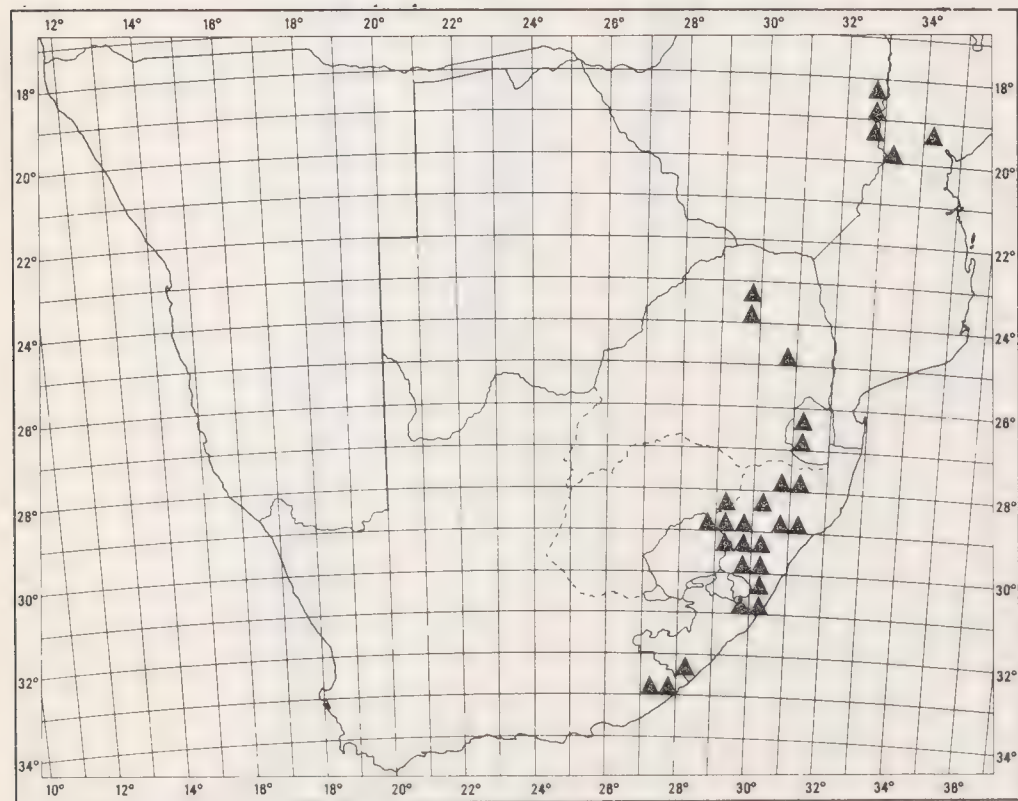
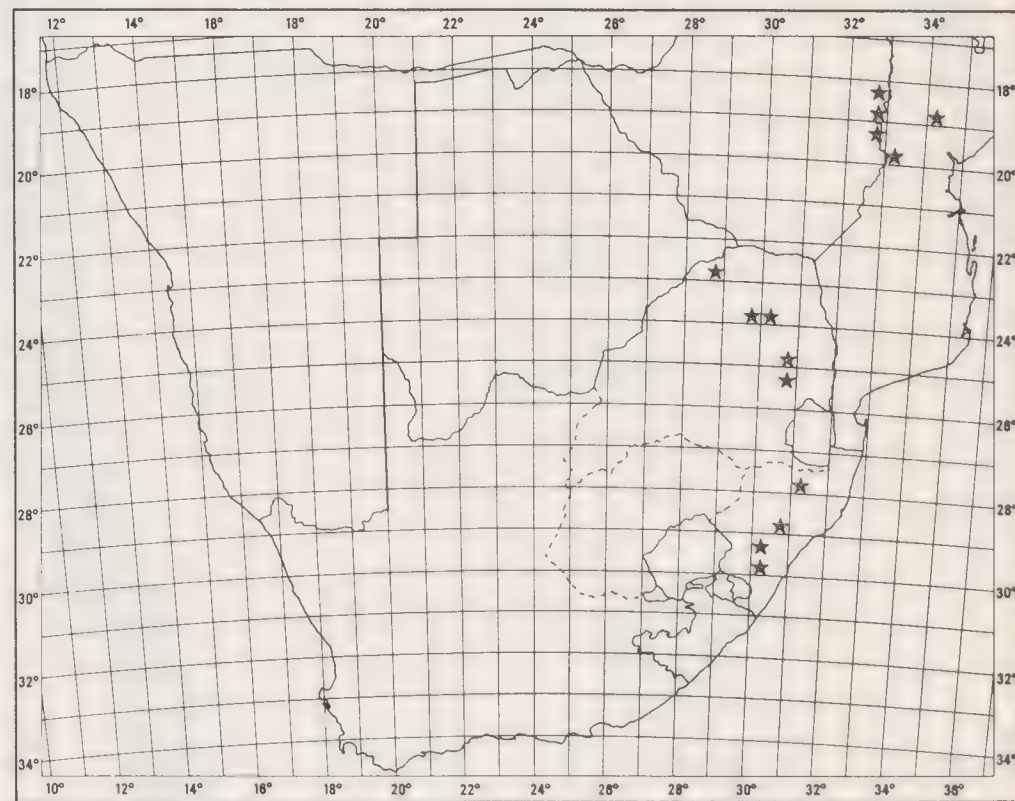
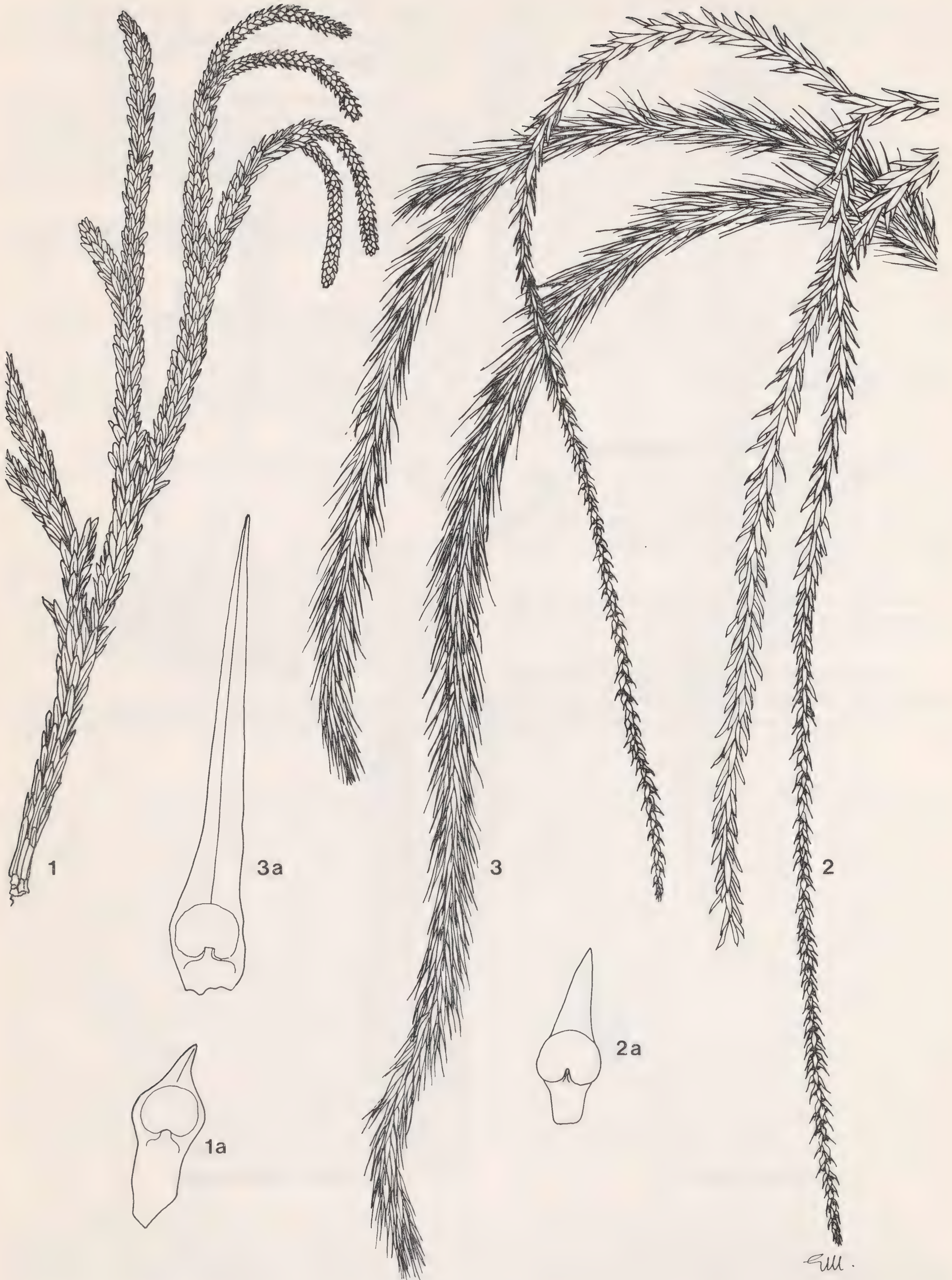
MAP 3.—*Lycopodium verticillatum*MAP 4.—*Lycopodium dacrydioides*

FIG. 2.—1, *Lycopodium saururus*, part of plant, × 0,6; 1a, megasporophyll, × 9 (*Tyson* s.n.). 2, *Lycopodium complanatum* subsp. *zanclophyllum*, part of plant, × 0,6; 2a, megasporophyll, × 4,8 (*Esterhuysen* 3557). 3, *Lycopodium carolinianum* var. *carolinianum*, part of plant, × 0,6; 3a, megasporophyll, × 9 (*MacOwan* 509). 4, *Lycopodium carolinianum* var. *grandifolium*, part of plant, × 0,6; 4a, megasporophyll, × 9 (*Schelpe* 5538).







Kenya, Uganda, Tanzania, Zaire, Malawi, Zimbabwe and Mozambique to Transvaal and Natal. Moist forest in shade, above 1 500 m. Map 4.

Vouchers: Roux 378 (NBG); Schelpe 6277 (BM; BOL); Scott 39 (PRE).

**4. *Lycopodium gnidioides* L. f., Suppl. 448 (1781); Sim, Ferns S. Afr. edn 2: 326, t. 177 (1915); Schelpe in F.Z. Pterid.: 18 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 135, t. 77 (1983). Type: Mauritius, Sonnerat s.n. (?P, ?iso.).**

*Plananthus gnidioides* (L. f.) Beauv., Prodr. L'Aethéog. 110 (1805). *Urostachys gnidioides* (L. f.) Herter ex Nessel, Bärlappgew. 187 (1939). *Huperzia gnidioides* (L. f.) Rothm. in Feddes Repert. 54: 61 (1944).

*Lycopodium funiculosum* Lam., Encycl. 3: 649 (1789). *Lepidotis funiculosa* (Lam.) Beauv., Prodr. L'Aethéog. 108 (1805). Type: Cape of Good Hope, Herb. Lamarck (P, holo.!-BM, photo.).

*Lycopodium flagelliforme* Schrad. in Gött. Gel. Anz. 1818: 920 (1818). Type: Cape Province, Albany, Hesse s.n. (LE, holo.!; GOET-BOL, photo.).

*Lycopodium ambiguum* Schrad., l.c. Type: Cape Province, Albany, Hesse s.n. (LE, holo.).

*Lycopodium pinifolium* Kaulf., Enum. Fil. 7 (1824). *Lycopodium gnidioides* var. *pinifolium* (Kaulf.) Pappe & Raws., Syn. Fil. Afr. Austr. 49 (1858); W.B.G. Jacobsen, Ferns Sthn Afr. 136, t. 78 (1983). Type: Cape Province, Cape Peninsula (?PH).

Epiphytic or lithophytic. *Stems* erect, arching or pendulous, dichotomously branched, up to 500 × 4 mm. *Leaves* very narrowly oblong,

coriaceous, acute to broadly acute, imbricate, up to 14 × 3 mm. *Sporophylls* much shorter than foliage leaves, broadly ovate, acute, closely imbricate, up to 3 × 2 mm. Fig. 3: 1.

South-western Cape Province to Transkei, Natal, Swaziland and Transvaal; rare in Zimbabwe and Mozambique; also on Madagascar and the Comoro and Mascarene Islands. Shady montane forest or ravines, 280–2 200 m. Map 5.

Vouchers: Esterhuysen 12556 (BOL; NBG; PRE); Fisher 812 (NH; NU; PRE).

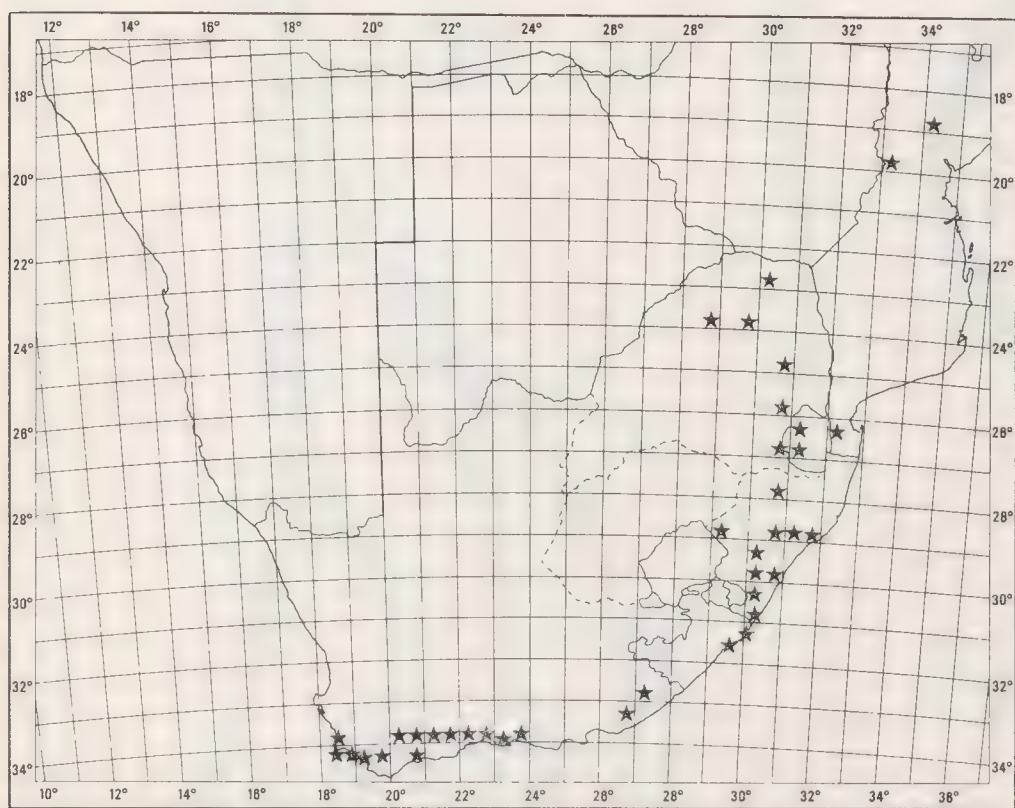
Varies considerably in habit in Southern Africa in the summer and winter rainfall regions, but exhibits a complete range of intermediate forms.

**5. *Lycopodium ophioglossoides* Lam., Encycl. 3: 646 (1789); Schelpe in F.Z. Pterid.: 18, t. 3 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 137, t. 79 (1983). Type: Mauritius, Comerson s.n. (P, holo.).**

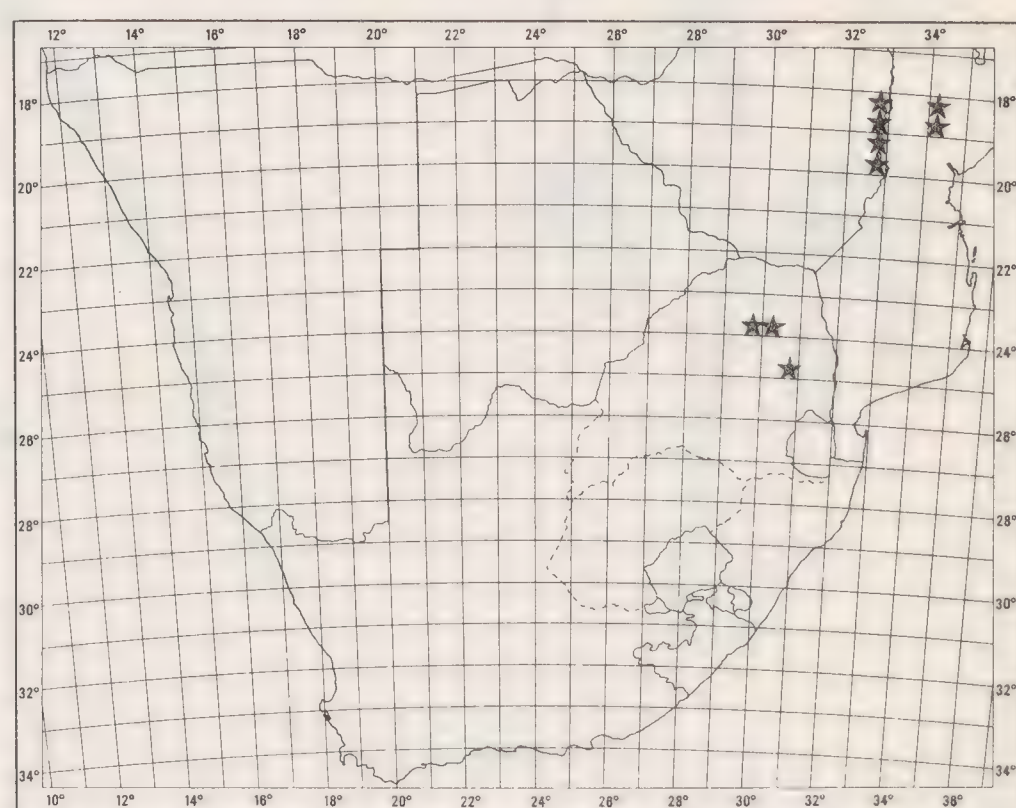
*Huperzia ophioglossoides* (Lam.) Rothm. in Feddes Repert. 54: 62 (1944).

Epiphytic or lithophytic. *Stems* pendulous, dichotomously branched, up to 300 × c. 1 mm. *Leaves* narrowly lanceolate, acute, narrowed towards base, very loosely imbricate, up to 11 × 1,2 mm. *Sporophylls* broadly ovate, entire, closely imbricate, c. 2 × 1,5 mm. Fig. 4: 3.

Widespread in tropical Africa from Sudan and Cameroon through Uganda, Tanzania, Zaire, Malawi, Zimbabwe and Mozambique to Transvaal. Also on Madagascar,



MAP 5.—*Lycopodium gnidioides*



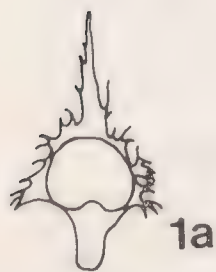
MAP 6.—*Lycopodium ophioglossoides*

FIG. 3.—1, *Lycopodium gnidioides*, exposed form, part of plant, × 0,6; 1a, megasporophyll, × 4,8 (Esterhuysen 15633). 2, *Lycopodium gnidioides*, forest form, part of plant, × 0,6; 2a, megasporophyll, × 4,8 (Schelpe 4313). 3, *Lycopodium dacrydioides*, part of plant, × 0,6; 3a, megasporophyll, × 4,8 (Schelpe 6277).





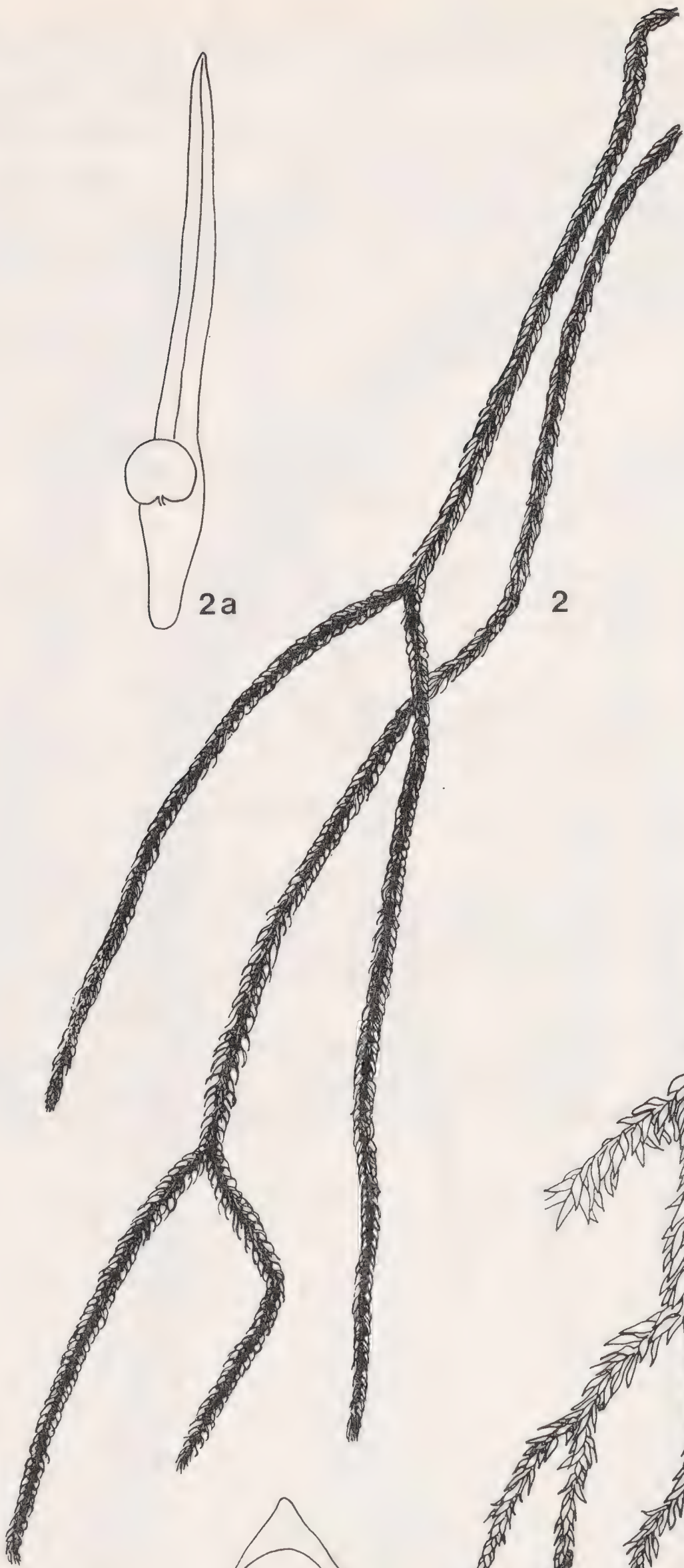
1



1a



2a



2



3a



3

Em.



Réunion, Fernando Po and Comoro Islands. A low-level epiphyte or lithophyte in 'moss-forests' in eastern Transvaal, 1 700–2 700 m. Map 6.

Vouchers: *Grewcock sub Moss* 20503 (BM; J; PRE); Roux 380 (NBG); *Schlechter* 4758 (BOL; GRA; PRE).

6. ***Lycopodium cernuum* L.**, Sp. Pl. 2: 1103 (1753); Sim, Ferns S. Afr. edn 2: 327, t. 179 fig. 1 (1915); Schelpe in F.Z. Pterid.: 20 (1970); in C.F.A. Pterid.: 19 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 138, t. 25,80 (1983). Type: ?India (LINN 1257/13, holo.).

*Lepidotis cernua* (L.) Beauv., Prodr. L'Aethéog. 101 (1805).

*Lycopodium secundum* K. Muell. in Bot. Ztg 19: 164 (1861). Syntypes: Cape Province and Natal, *Gueinzus* s.n.

Terrestrial. Stems erect, leafy, up to  $850 \times 3$  mm, with much branched leafy lateral branches bearing strobili, rooting at base and producing arching leafy stolons from near base. Leaves subulate, patent, curved forward, up to  $4 \times 0,3$  mm basally. Strobili not pedunculate, solitary at apex of branches, up to 10 mm long. Sporophylls broadly ovate-acuminate, up to  $1,8 \times 1,2$  mm, margins lacerate. Fig. 4: 1.

Cosmopolitan. South-western Cape Province to Transkei, Natal, Swaziland, Transvaal, Zimbabwe, Mozambique, Malawi, Zambia, Angola, Zaire, Tanzania, Kenya, Uganda, Ethiopia, Sudan, Gabon, Cameroun,

Nigeria, Ghana, Liberia, Sierra Leone, as well as Fernando Po, São Tomé, St Helena, Madagascar and Seychelles. Continually moist streambanks and ditches, from sea level in the south to between 1 000 and 2 000 m in Transvaal and Zimbabwe. Map 7.

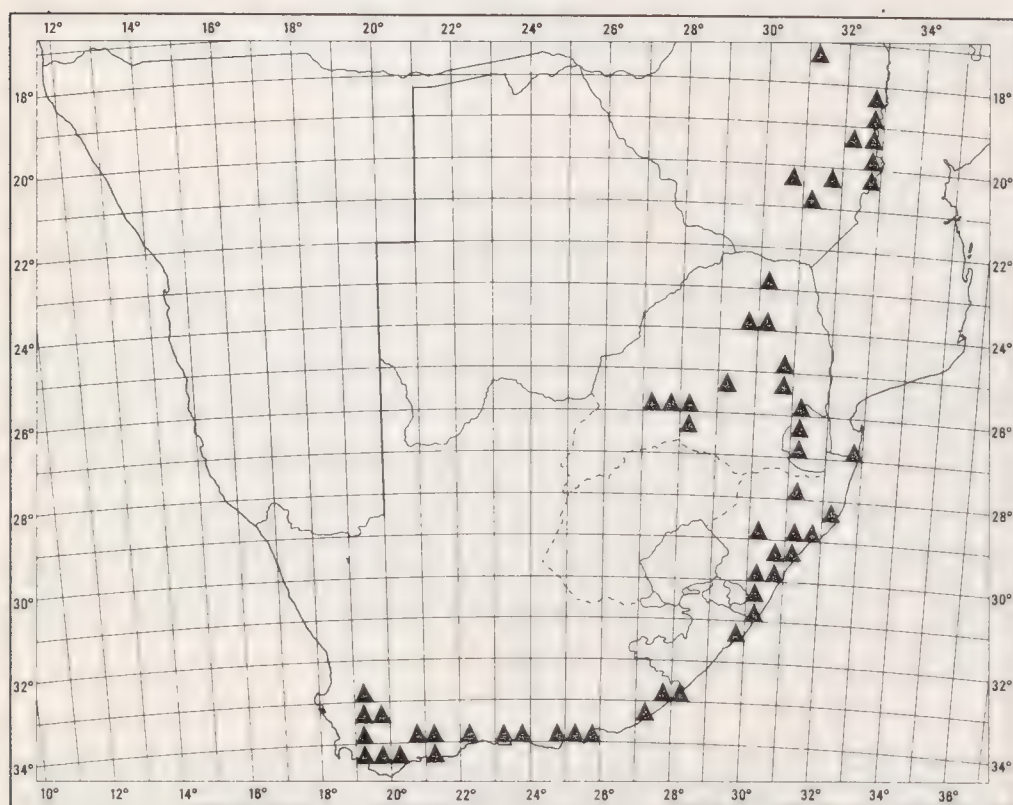
Vouchers: *Esterhuysen* 4197 (BOL; PRE); *Kruger* 1162 (STE); *Pegler* 961 (BOL; PRE); *Roux* 391 (NBG); *Tinley* 525 (NPB; NU).

7. ***Lycopodium clavatum* L.**, Sp. Pl. 2: 1101 (1753); Sim, Ferns S. Afr. edn 2: 328, t. 180 (1915); Schelpe in C.F.A. Pterid.: 21 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 140, t. 82 (1983). Type: Europe, ?Hort. Sicc. Cliff. (?BM, holo.).

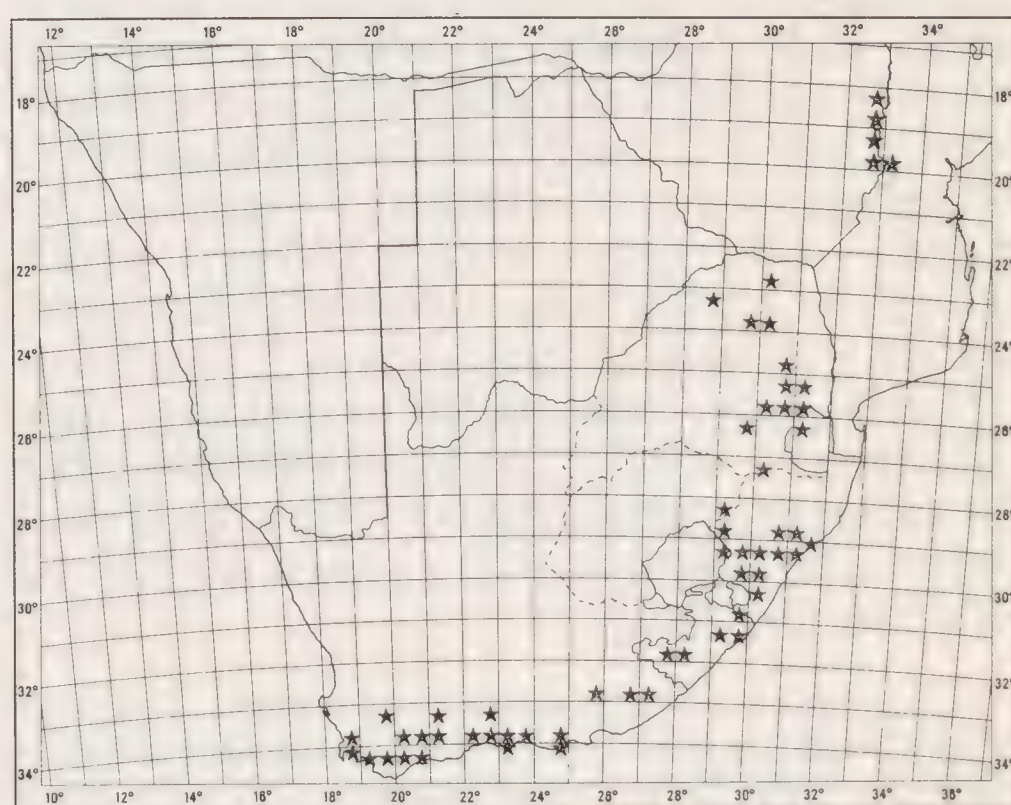
*Lepidotis inflexa* Beauv., Prodr. L'Aethéog. 109 (1805). *Lycopodium inflexum* (Beauv.) Swartz, Syn. Fil. 179 (1806). *Lycopodium clavatum* var. *inflexum* (Beauv.) Spring., Monog. Lycopod. 1: 90 (1842); Schelpe in F.Z. Pterid.: 20 (1970). Type: Mauritius, *Bory* s.n., Herb. Del-essert (G, holo.).

*Lycopodium clavatum* var. *natalense* Nessel in Feddes Repert. 36: 191, t. 176 (1934), as *nataliense*. Type: Natal, *Holz* s.n. (?BONN, holo.).

Terrestrial. Main stem creeping, up to 3 mm in diameter, producing dichotomously branched upright stems at 50–100 mm intervals. Leaves narrowly lanceolate, patent to suberect or imbricate, up to  $5 \times 0,5$  mm, with a translucent hair point up to 3 mm long apically, margin usually entire but sometimes ciliate in leaves on main stem. Strobili pedunculate,



MAP 7.—*Lycopodium cernuum*



MAP 8.—*Lycopodium clavatum*

FIG. 4.—1, *Lycopodium cernuum*, portion of plant,  $\times 0,6$ ; 1a, megasporophyll,  $\times 9$  (*Schelpe* 4360). 2, *Lycopodium verticillatum*, part of plant,  $\times 0,6$ ; 2a, megasporophyll,  $\times 9$  (*Schelpe* 6249). 3, *Lycopodium ophioglossoides*, part of plant,  $\times 0,6$ ; 3a, megasporophyll,  $\times 9$  (*Schelpe* 5516).



20–80 mm long in groups of 2–5 (rarely solitary) at apex of sparsely leafy peduncle up to 190 mm long. *Sporophylls* broadly ovate, acuminate,  $2-3 \times 1,5-2$  mm, margin finely lacerate.

South-western Cape Province to Transkei, Natal, Lesotho, Swaziland, Transvaal, Zimbabwe, Mozambique, Malawi, Angola, Zaire, Tanzania, Kenya, Uganda, Ethiopia, Sudan, Cameroun, as well as Madagascar, Réunion, Mauritius and Sao Tomé. Sheltered mountain slopes amongst rocks and continually moist margins of montane forest, 1 600–2 300 m. Map 8.

Vouchers: *Cooper* 1048 (BM; K; NH; PRE); *Dieterlen* 670 (K; NBG; PRE; SAM; STE); *Fisher* 870 (BOL; NU; PRE); *Rudatis* 1249 (BM; K; PRE; STE); *Van Jaarsveld* 6121 (BOL).

8. ***Lycopodium complanatum* L., Sp. Pl. 2: 1104 (1753).** Type: Germany, Münchenhausen (LINN 1257/20, holo.).

The typical form does not occur in Southern Africa but there is one subspecies:

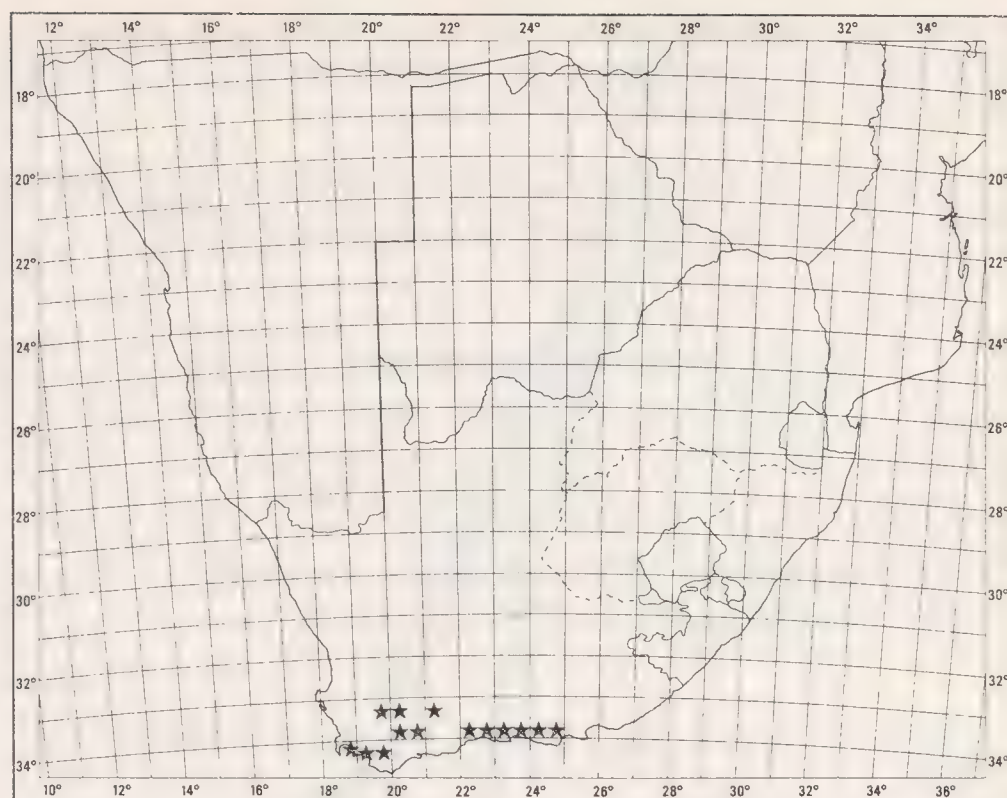
Subsp. ***zanclophyllum* (Wilce) Schelpe** in Jl S. Afr. Bot. 35: 128 (1969); W. B. G. Jacobsen, Ferns Sthn Afr. 141, t. 83 (1983). Type: Madagascar, *Hildebrandt* 3781 (P, holo.).

*Lycopodium zanclophyllum* Wilce in Nova Hedwigia 3: 108, t. 3A figs 9, 10, t. 3B figs 9, 10, t. 8 (1961).

Terrestrial. *Stems* horizontal, terete, creeping or subterranean, densely or sparsely leafy respectively, up to 2 mm in diameter, producing erect, repeatedly dichotomously branched aerial stems, obconic in outline, at intervals, 40–300 mm high excluding strobili and peduncles, branches laterally compressed to greater or lesser extent. *Leaves* subulate to narrowly lanceolate, with apices curved forward, entire,  $1,5-2 \times c. 0,6$  mm. *Strobili* pedunculate, 15–50 mm long in groups of 2–8 at apex of sparsely leafy peduncle up to 200 mm long. *Sporophylls* broadly lanceolate with paler erose to subentire margin,  $2,6 \times 1$  mm, to broadly ovate acuminate with with an erose margin,  $2,8 \times 2$  mm. Fig. 2: 2.

Mountains of south-western and southern Cape Province, as well as Madagascar, Madeira and the Azores. On rocky sheltered slopes, usually between 1 000 and 2 300 m altitude. Map 9.

Vouchers: *Esterhuysen* 3558 (BOL; PRE; SAM); 27330 (BOL; MO; PRE); 33898 (B; BM; BOL; C; GH; M; MO; P; PR; PRE; S); *Moll* 5990 (B; BM; BOL; C; GH; K; M; MO; NBG; P; PR; PRE; S); *Stokoe* s.n. (NBG; PRE; SAM).



MAP 9.—*Lycopodium complanatum* subsp. *zanclophyllum*

9. ***Lycopodium carolinianum* L., Sp. Pl. 2: 1104 (1753);** Sim, Ferns S. Afr. edn 2: 329, t. 181 fig. 1 (1915); W. B. G. Jacobsen, Ferns Sthn Afr. 138 (1983).

Leaves all approximately of similar size and shape ..... 9 (a). var. *carolinianum*  
Lateral leaves larger and more fleshy than dorsal leaves ..... 9 (b). var. *grandifolium*

9 (a). var. ***carolinianum*.**

Schelpe in F. Z. Pterid.: 21 (1970). Type: North America, Carolina, Herb. Dillenius CX-LII (OXF, holo.).

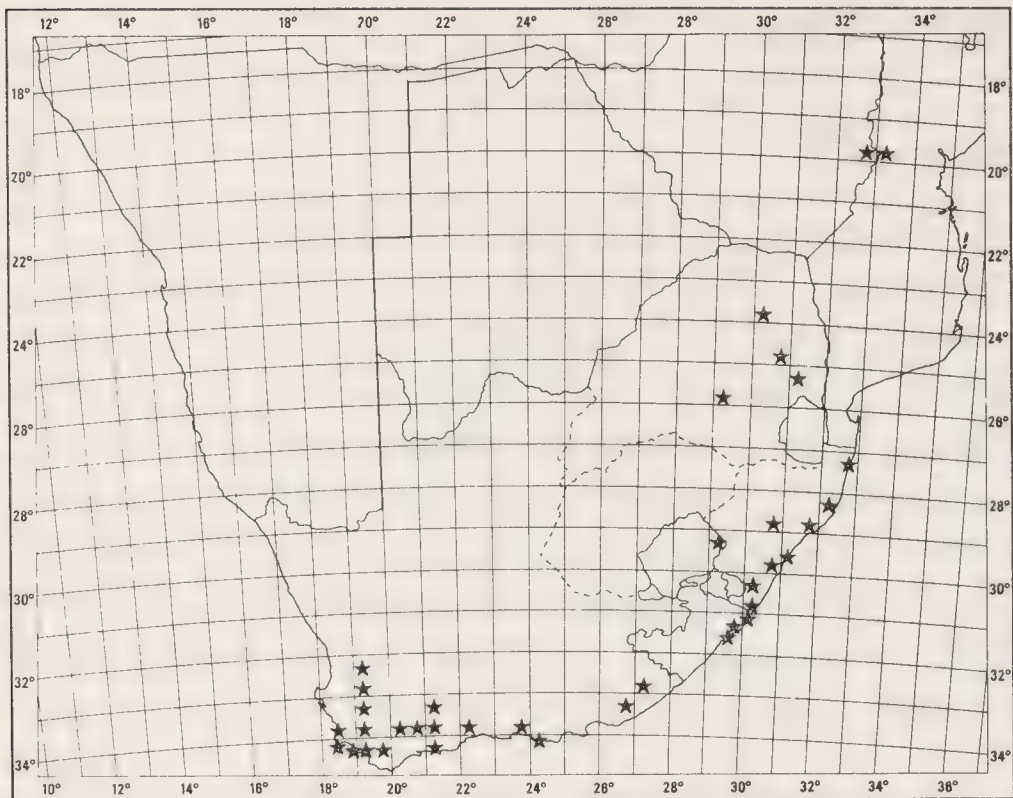
*Lycopodium ericetorum* Schrad. in Gött. Gel. Anz. 1818: 920 (1818). Type: Cape Province, *Hesse* s.n. (LE, holo.!—BOL, photo.).

Terrestrial. *Main stem* creeping, up to 6 mm in diameter, somewhat dorsiventrally flattened. *Leaves* lanceolate to oblong, often furcate, up to  $15 \times 4$  mm, lateral leaves spreading horizontally, dorsal leaves smaller than lateral leaves, appressed or curving erect. *Strobili* solitary, up to  $70 \times 6$  mm, borne at apex of unbranched sparsely leafy peduncle up to 300 mm long. *Sporophylls* broadly ovate-acuminate, up to  $5,5 \times 2$  mm. Fig. 2: 3.

South-western Cape Province to Transkei, Natal, Transvaal, Zimbabwe, Mozambique and Zambia, as well as north-east temperate America. In peaty marshy localities and on rock faces that are wet for the greater part of the year, 300–2 000 m altitude. Map 10.

Vouchers: *Compton* 22673 (NBG); *Dümmer* 1067 (BOL; NH; SAM); *Medley Wood* 11949 (BOL; PRE; SAM); *Tinley* 310 (NPB; NU).

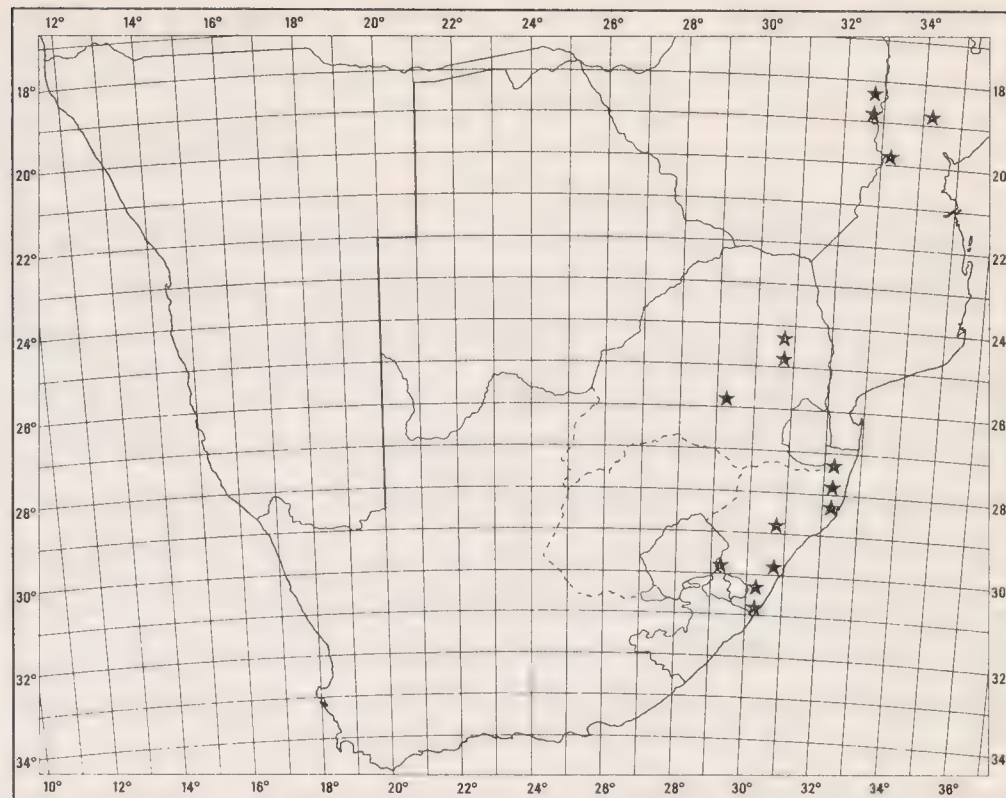


MAP 10.—*Lycopodium carolinianum* var. *carolinianum*

9(b). var. **grandifolium** Spring in Bull. Acad. Belg. 24: 46 (1849–1850); Schelpe in F.Z. Pterid.: 21 (1970); in C.F.A. Pterid.: 22 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 139, t. 81 (1983). Type: Transvaal, Magaliesberg, *Burke* 531 (K, lecto.!).

*Lycopodium carolinianum* sensu Sim, Ferns S. Afr. edn 2: 329, t. 181 (1915).

Terrestrial. Stem creeping, dorsiventrally flattened, up to 6 mm in diameter. Lateral

MAP 11.—*Lycopodium carolinianum* var. *grandifolium*

leaves oblong falcate, up to  $10 \times 4$  mm; dorsal leaves reduced to scales, c.  $2 \times 1$  mm. Fig. 2: 4.

From Natal to Zimbabwe, Mozambique and Angola. Marshy ground from 1 200 to 1 800 m altitude. Map 11.

Vouchers: *Compton* 30675 (N BG); *Davidson* 175 (BOL; J); *Hilliard & Burt* 10262 (E; NU); *Rudatis* 1363 (STE).







## SELAGINELLALES

## SELAGINELLACEAE

Terrestrial herbs, annual or perennial. *Stems* erect, decumbent or creeping, bearing aerial roots (rhizophores); primary and secondary branch systems often regular in shape forming a pseudofrond. *Leaves* ligulate (i.e. with microscopic tongue of tissue on adaxial base), small, thin, either spirally arranged and  $\pm$  similar in shape and size, or in two ranks, those in the centre (median leaves) facing upwards, and those below (lateral leaves) sideways. *Sporophylls* may be similar or dimorphic as in leaves. *Sporangia* borne singly in axils of sporophylls, arranged in strobili (which may or may not be dorsiventral), dehiscent with 2 valves. *Spores* of two kinds, borne in separate sporangia; *megaspores* usually 4 (rarely 1 or 8), trilete, laesurae usually forming a 3-radiate ridge reaching an equatorial ridge; prothalli bearing archegonia only; *microspores* many, trilete or more rarely monolete, laesurae usually less distinct; prothalli bearing antheridia only.

## SELAGINELLA

**Selaginella** Beauv., Prodr. 101 (1805); Engl., Pflanzenw. Afr. 2: 76 (1908); Alston in Mém. Inst. fr. Afr. noire 50: 26 (1957); in F.W.T.A. edn 2, Suppl. 14 (1959); Tardieu-Blot in Fl. Gabon 8: 12 (1964); in Fl. Camer. 3: 21 (1964); Schelpe in F.Z. Pterid.: 22 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 13 (1973); in C.F.A. Pterid.: 23 (1977); nom. conserv. Type species: *S. spinosa* Beauv., nom. illeg. (= *Lycopodium selaginoides* L.; *S. selaginoides* (L.) Link).

Description as for family.

A large genus of about 700 species found mainly in the tropics. Seven species occur in Southern Africa.

1a Leaves of all branch systems  $\pm$  similar:

2a Leaves widely spaced, spreading or reflexed; plant erect, annual ..... 1. *S. pygmaea*

2b Leaves crowded, subulate aristate (with terminal seta); plant creeping, perennial:

3a Seta on leaf apex  $\frac{1}{4}$  or less the length of the blade; sporophylls in 4 ranks:

4a Seta translucent; leafy stem radially symmetrical in position of leaves ..... 4. *S. caffrorum*

4b Seta very short, opaque; leafy stem dorsiventral in position of leaves ..... 3. *S. njam-njamensis*

3b Seta on leaf apex  $\frac{1}{3}$  or more the length of the blade; sporophylls in 2 ranks ..... 2. *S. dregei*

## 1b Leaves of at least the secondary branch systems markedly dimorphic:

5a Primary branch system erect, without branches at least in lower half ..... 5. *S. imbricata*

5b Primary branch system creeping, or if erect then branched from base:

6a Lateral leaves 3–4 mm long, not curled beneath stem when dry; hyaline teeth of equal lengths around margins of medial leaves ..... 6. *S. kraussiana*

6b Lateral leaves 2 mm or less in length, curling beneath stem when dry; hyaline teeth becoming longer cilia at base of medial leaves ..... 7. *S. mittenii*

1. **Selaginella pygmaea** (Kaulf.) Alston in J. Bot., Lond. 69: 257 (1931); W. B. G. Jacobsen, Ferns Sthn Afr. 150, t. 94 (1983). Type: Cape Province, Cape Peninsula, Devil's Peak, Bergius s.n. (?B, holo.).

*Lycopodium pygmaeum* Kaulf., Enum. Fil. 9 (1824). *Lycopodium pumilum* var. *pygmaeum* (Kaulf.) Schlechtd., Adumbr. 6 (1825). *Lycopodioides pygmaeum* (Kaulf.) Knutze, Rev. Gen. 1: 825 (1891).

*Lycopodium bryoides* Kaulf., Enum. Fil. 10 (1824). *Lycopodium pumilum* var. *bryoides* (Kaulf.) Schlechtd., Adumbr. 6 (1825). *Selaginella bryoides* (Kaulf.) Hieron. in Engl. & Prantl, Pflanzenfam. 1, 4: 499 (1901), non Underw. (1900). Type: Cape Province, Cape Peninsula, Bergius s.n. (?B, holo.).

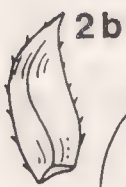
*Lycopodium pumilum* Schlechtd., Adumbr. 6, t. 3 (1825). *Selaginella pumila* (Schlechtd.) Spring in Mém. Acad. Belg. 24: 60 (1848); Sim, Ferns S. Afr. edn 2: 332, t. 182 figs 2, 3 (1915), nom. illeg.

*Selaginella pumila* var. *ramosa* Spring in Mém. Acad. Belg. 24: 61 (1848). Type as for *L. bryoides* Kaulf.

*Selaginella pumila* var. *subsimplex* Spring in Mém. Acad. Belg. 24: 61 (1848): Type as for *L. pygmaeum* Kaulf.

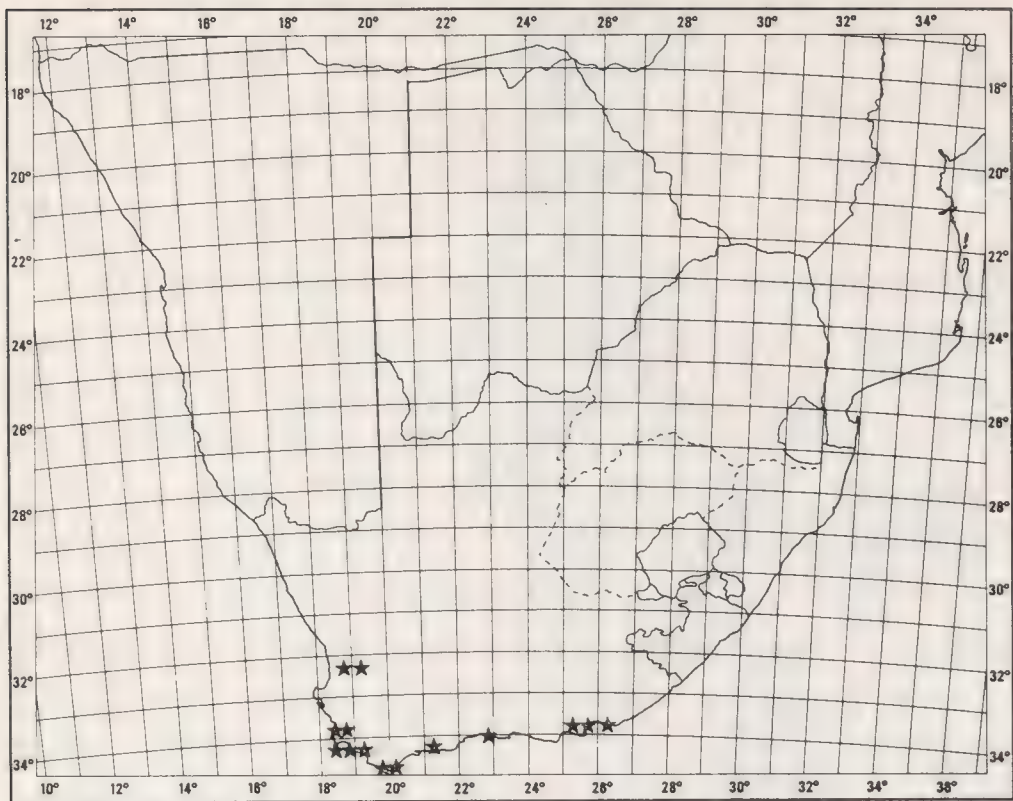
Plant annual. *Stems* erect or suberect, very slender, 25–140 mm long, only rooting at base, simple or sparingly branched, branches alternate, 6–12 mm long, all terminating in 1 or 2 strobili 6–12  $\times$  2 mm, Leaves distant, radially





MLB.



MAP 12.—*Selaginella pygmaea*

symmetrical, green at first, ovate-cordate, acuminate, entire, patent, c.  $2 \times 1$  mm, later reflexed and yellow. *Sporophylls* in 4 ranks, broadly ovate, apex tapering acuminate. *Megaspores* subrugulose, c.  $420\text{--}510\text{ }\mu\text{m}$ . *Microspores* verrucate-scabrate, c.  $60\text{--}70\text{ }\mu\text{m}$ . Fig. 5: 1.

Endemic to Cape Province; in sclerophyll scrub on clay. Map 12.

Vouchers: Hugo 2692 (STE); Parker 4273 (BOL; NBG); Schlechter 1724 (BM; K; PRE); 9537 (BM; BOL; K; PRE).

2. *Selaginella dregei* (Presl) Hieron. in Hedwigia 39: 315, t. 36 (1900); Jermy in F.Z. Pterid.: 23, t. 4 (1970); Schelpe in C.F.A. Pterid.: 25 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 143, t. 84 (1983). Type: Transkei, Umsikaba River, *Drègeb* (PR, holo.; BM!).

*Lycopodium dregei* Presl in Abh. K. Böhm, Ges. Wiss., Ser. 5, 3: 583 (1845), reimpr. in Presl, Bot. Bemerk. 153 (1846). *Selaginella rupestris* forma *dregei* (Presl) Milde, Fil. Europ. Atlant. 262 (1867). *Selaginella rupestris* var. *recurva* forma *dregei* (Presl) A. Br. ex Kuhn, Fil. Afr. 214 (1868), as *dregeana*.

*Selaginella dregei* var. *bachmanniana* Hieron. in Hedwigia 39: 317 (1900). Type Transkei, Pondoland, *Bachmann* 9 (B, holo.).

*Selaginella dregei* var. *pretoriensis* Hieron. in Hedwigia 39: 317 (1900). Type: Transvaal, near Pretoria, *Rehmann* 4333 (B, lecto.).

*Selaginella dregei* var. *rehmanniana* Hieron. in Hedwigia 39: 317 (1900). Type: Transvaal, Houtbosch, *Rehmann* 5576 (B, lecto. !; BOL !; K !).

Plant creeping, often forming loose mats. *Stems* prostrate, primary branches often irregularly ascendent, 1- to 3-furcate; leafy stem radially symmetrical or occasionally slightly dorsiventral in position of leaves. *Leaves* herbaceous, often brown and papyraceous below, narrowly deltate to linear or subulate,  $1,5\text{--}2,25 \times 0,25$  mm, adnate basally, margins with pili-form cilia, acuminate apically, tapering into a usually curved opaque seta  $\frac{1}{3}$  to  $\frac{1}{2}$  as long as blade. *Strobili* suberect, dorsiventral, 4–8 mm long; *sporophylls* in 2 ranks on under side, broader and more lanceolate than leaves, apex not setose. *Megaspores* subgranulate,  $350\text{--}440\text{ }\mu\text{m}$ , triradiate ridges indistinct. *Microspores* scabrate,  $40\text{--}50\text{ }\mu\text{m}$ . Fig. 6: 2.

Transkei, Natal, Orange Free State, Swaziland, Transvaal, Botswana, Zimbabwe, Zambia, Angola, Mozambique, Malawi, Zaire, Kenya and Uganda. Growing in the open and under scrub in rocky situations, especially over igneous (acid) rocks, between 610 and 1 520 m altitude, Map 13.

Vouchers: Burrows 1376 (BOL; NBG); Codd & Dyer 9232 (BOL; K; PRE); Pooley 1467 (NPB; NU); Schelpe 5937 (BM; BOL; K).

A variable species.

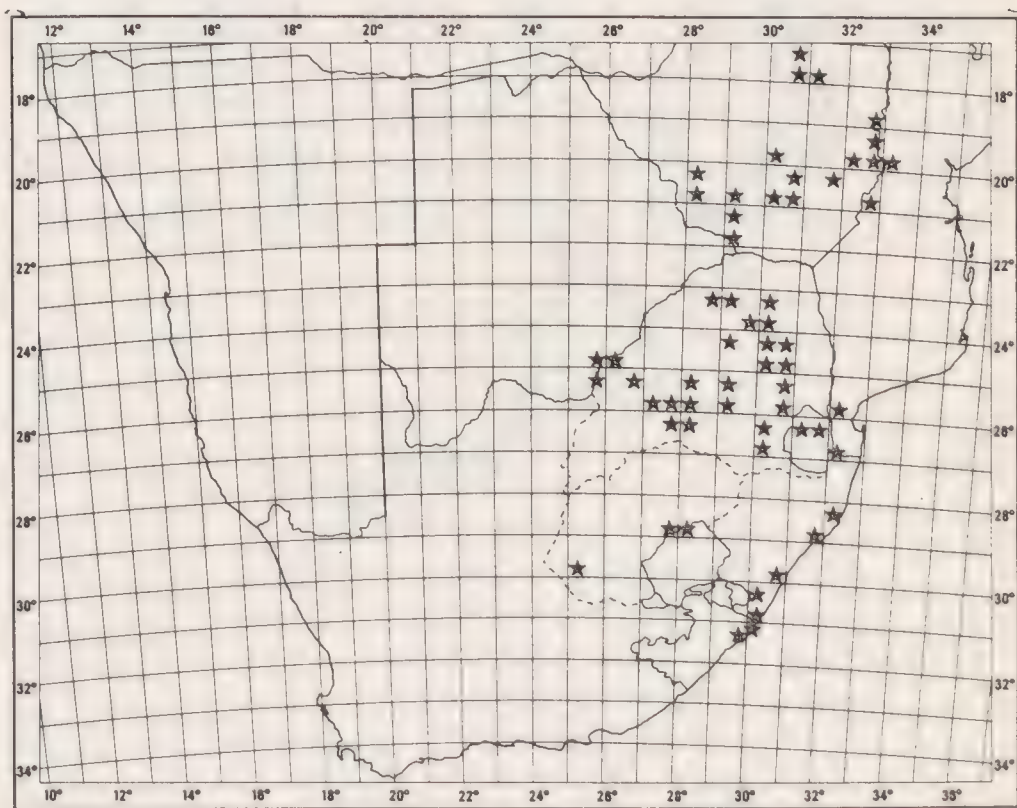
MAP 13.—*Selaginella dregei*

FIG. 5.—1, *Selaginella pygmaea*, plant,  $\times 0,6$ ; 1a, enlargement of fertile apex of branch,  $\times c. 9$  (Esterhuysen 4134). 2, *Selaginella imbricata*, part of plant,  $\times 0,6$ ; 2a, enlargement of portion of branch, showing heteromorphic leaves,  $\times c. 4,8$ ; 2b, median leaf,  $\times c. 4,8$ ; 2c, lateral leaf,  $\times c. 4,8$  (Leistner, Oliver, Steenkamp & Vorster 136). 3, *Selaginella mittenii*, part of plant,  $\times 0,6$ ; 3a, enlargement of portion of branch, showing heteromorphic leaves,  $\times c. 7,2$  (Buchanan sub BOL 23609).





MLB.

FIG. 6.—1, *Selaginella kraussiana*, part of plant,  $\times 0,6$ ; 1a, portion of branch,  $\times 6$  (Schelpe 6218). 2, *Selaginella dregei*, part of plant,  $\times 0,6$ ; 2a, portion of branch,  $\times 6$ ; 2b, leaf,  $\times 12$  (Schelpe 5081). 3, *Selaginella caffrorum*, part of plant,  $\times 0,6$ ; 3a, portion of branch,  $\times 6$ ; 3b, leaf,  $\times 12$  (Braithwaite 182).



3. *Selaginella njam-njamensis* Hieron. in Hedwigia 39: 312 (1900); Jermy in F.Z. Pterid.: 23 (1970); Schelpe in C.F.A. Pterid.: 25 (1977). Type: Sudan, Njam-Njam, *Schwein-furth* s.n. (B, holo.).

Plant creeping, with short prostrate branch system, 1- or 2-furcate. *Leafy stem* dorsiventral in position and length of leaves. *Median leaves* herbaceous, lanceolate to ligulate-deltate, c.  $2 \times 0,25$  mm, base adnate, margins with short dentiform cilia above, longer piliform cilia towards base, apex acuminate tapering into stout tawny or subopaque white seta  $\frac{1}{4}$  or less the length of blade; *lateral leaves* up to 2,5 mm long, similar but more linear-lanceolate and slightly longer. *Strobili* 3–10 mm long, sporophylls in 4 ranks, those on upper side of strobili lanceolate, acuminate, margins with short cilia, apex acuminate, those on lower side slightly longer and broader. *Megaspores* granulate,  $200\text{--}325\ \mu\text{m}$ ; tri-radiate ridges indistinct. *Microspores* narrowly winged, scabrate with firm ridges,  $35\text{--}40\ \mu\text{m}$ .

Botswana, Angola, Malawi, Mozambique, Zambia, Sudan, Cameroun, Nigeria and Benin. A plant of rocky places, 400–1 000 m. Map 17.

Voucher: Appleyard s.n. (SAM).

*S. njam-njamensis*, which occurs from Sudan and Uganda south to Angola, Malawi, Botswana and Mozambique, differs from *S. dregei* in having a much shorter opaque seta, shorter cilia on the leaf margins and in having the sporophylls arranged in four ranks.

4. *Selaginella caffrorum* (Milde) Hieron. in Hedwigia 39: 313 (1900); Alston in J. Bot., Lond. 77: 223, t. 620 A–D (1939); Schelpe in C.F.A. Pterid.: 24 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 144, t. 85 (1983). Type: ?Transkei, Herb. Bunge (?LE, holo.).

*Selaginella rupestris* forma *caffrorum* Milde, Fil. Europ. Atlant. 262 (1867).

*Selaginella capensis* Hieron. in Hedwigia 39: 314 (1900). Syntypes: from South Africa (B).

*Selaginella rupestris* sensu Sim, Ferns S. Afr. edn 2: 332, t. 179 fig. 2 (1915).

Plant creeping, often forming loose mats. *Stems* prostrate, primary branches often irregularly ascendent, 1- to 3-furcate; *leafy stem* radially symmetrical or occasionally slightly dorsiventral in position of leaves. *Leaves* dark green and papyraceous below, narrowly deltate to linear or subulate, c.  $2,5\text{--}3 \times 0,5$  mm, adnate basally, margins with piliform cilia, acuminate apically, tapering into a translucent, yellowish seta less than  $\frac{1}{4}$  blade-length. *Strobili* c.

3 mm long; *sporophylls* in 4 ranks, broader than leaves, ovate-deltate, c.  $2 \times 0,75$  mm, apex not setose. *Megaspores* reticulate with thin narrow wings, triradiate ridge prominent,  $410\text{--}460\ \mu\text{m}$ . *Microspores* echinate,  $40\text{--}60\ \mu\text{m}$ . Fig. 6: 3.

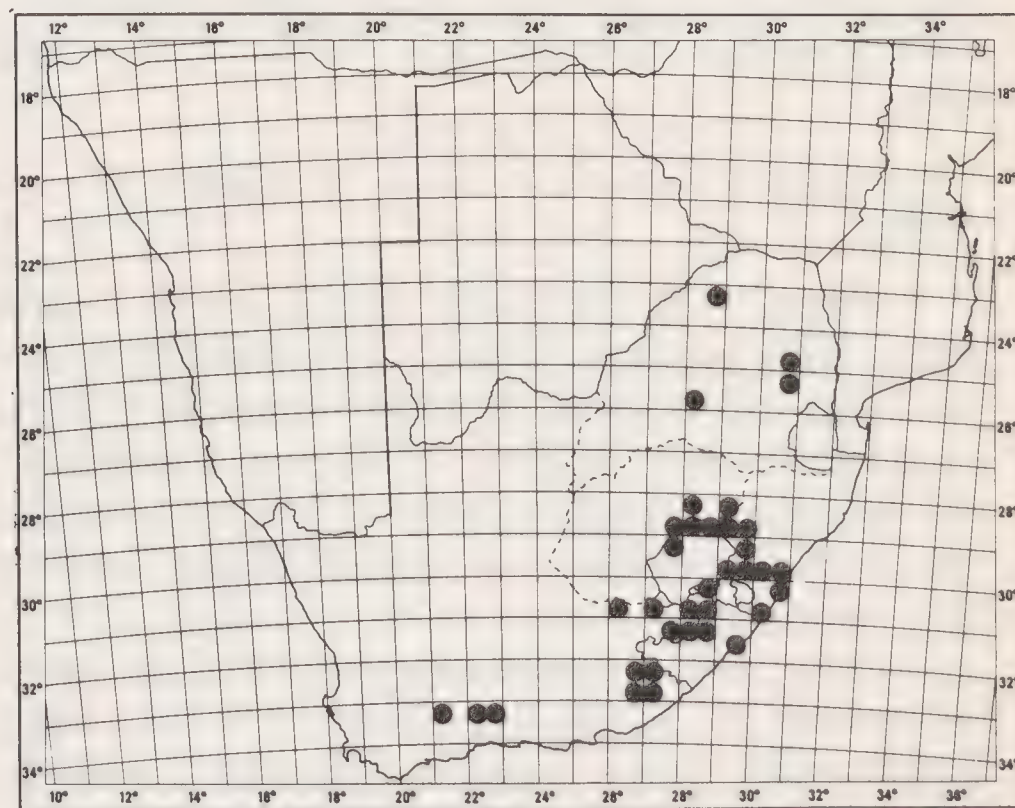
Southern and eastern Cape Province, Transkei, Natal, Lesotho, Orange Free State, Transvaal and Angola. On rock surfaces, in rock crevices and at the bases of boulders. Map 14.

Vouchers: Codd & Dyer 9229 (BOL; PRE); Hepburn 177 (GRA); Hilliard & Burt 13382 (BOL; E; NU); Rycroft 2739 (NBG; STE); Schelpe 4567 (B; BOL; GH; K; M; MO; P; PRE; S; US).

5. *Selaginella imbricata* (Forssk.) Spring ex Decne. in Arch. Mus. 2: 193, t. 7 (1841–2); Sim, Ferns S. Afr. edn 2: 336, t. 184 fig. 3 (1915); Jermy in F.Z. Pterid.: 25 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 144, t. 87 (1983). Type: Arabia, Yemen, near Hadie and Nahfat, Herb. Forsskal vii/20 (C, holo.!).

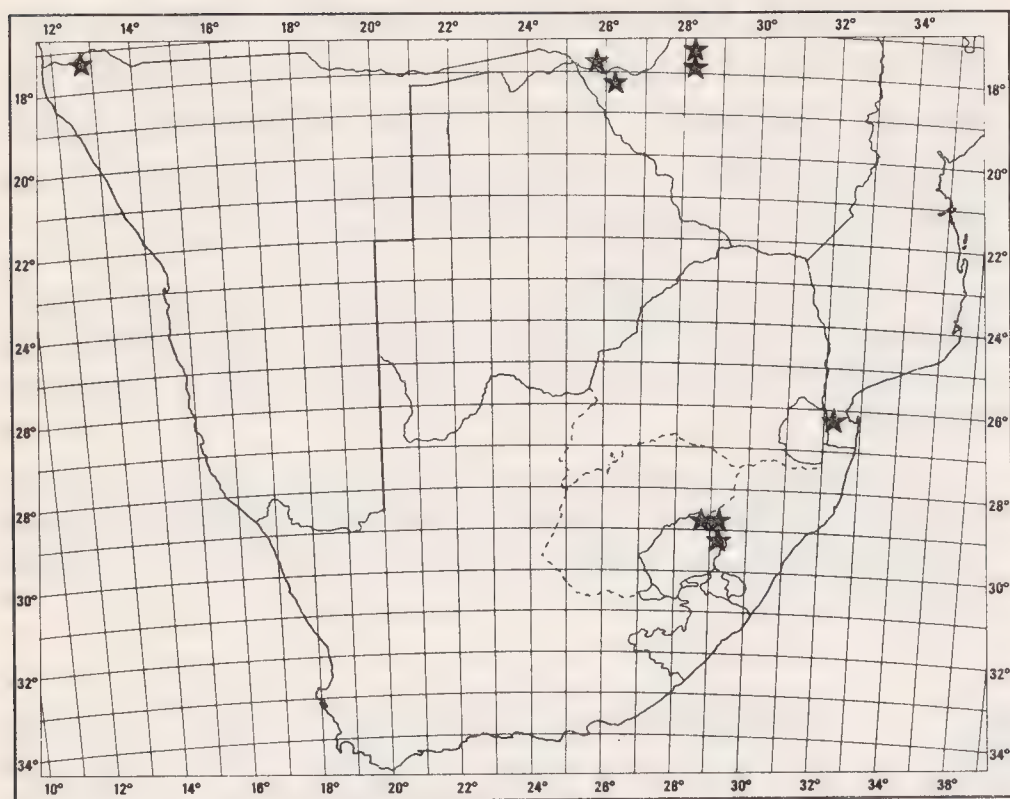
*Lycopodium imbricatum* Forssk., Fl. Aegypt.-Arab. cxxv, 187 (1775).

Plant creeping, 1–3 stems arising from a stout stolon, stems 50–300 mm long. *Primary branch system* ovate to lanceolate in outline when moist; *secondary branches* with 3–8 ultimate branches 4–8 mm long (further forking may occur). Leaves heteromorphic, adnate basally: median leaves oblong-lanceolate, tapering, c. 1,25 mm long, margins with broad band of hyaline cells, dentate except apically; lateral leaves contiguous or overlapping, oblong-elliptic, c.  $1,5 \times 0,5$  mm, apex obtuse, margins entire. *Strobili* borne at tips of ultimate branches, 5–8 mm long; *sporophylls* undifferentiated, somewhat similar to median leaves.



MAP 14.—*Selaginella caffrorum*



MAP 15.—*Selaginella imbricata*

*Megaspores*  $\pm$  smooth or punctulate with faint triradiate ridge, of 2 sizes: 150  $\mu$ m and 300  $\mu$ m. *Microspores* minutely foveoreticulate, 70–80  $\mu$ m. Fig. 5: 2.

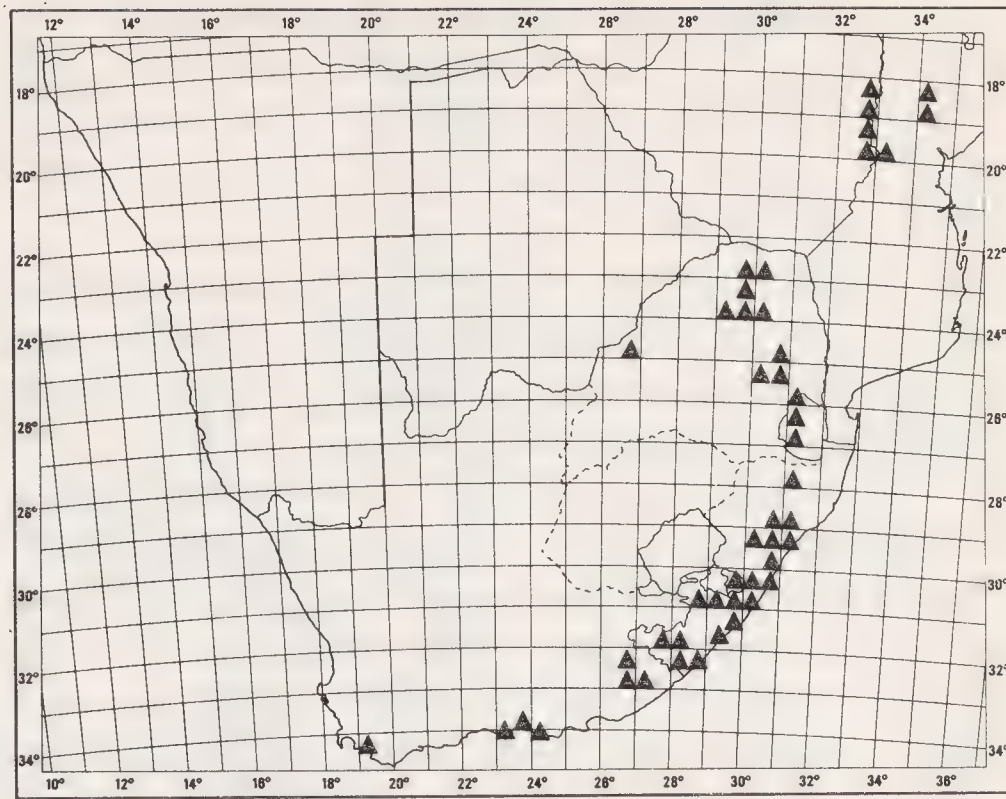
Natal, South West Africa/Namibia, Zimbabwe, Mozambique, Zambia, Madagascar, Kenya, Somalia, Ethiopia, Sudan and Arabia. On basalt outcrops in the Natal Drakensberg in moist crevices between 490 and 2 990 m. Map 15.

Vouchers: Craven 925 (M; WIND); Esterhuysen 26097 (BM; BOL; K; NBG); 29601 (B; BM; BOL; C; K; M; MO; P; PR; PRE; S); 30228 (B; BM; BOL; C; MO; P; PRE); 30234; 30244 (B; BM; BOL; C; GH; M; MO; P; PR; PRE; S).

6. *Selaginella kraussiana* (Kunze) A. Br. ex Kuhn, Fil. Afr. 193 (1868); Sim, Ferns S. Afr. edn 2: 335, t. 182 fig. 1 (1915); Jermy in F.Z. Pterid.: 26 (1970); Schelpe in C.F.A. Pterid.: 30 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 146, t. 89 (1983). Type: Cape Province, Tsitsikamma, Krauss s.n. (LZ, syn.†; K, lecto.!).

*Lycopodium kraussiana* Kunze in Linnaea 18: 114 (1844).

Plant wide-creeping. Stems up to 0,5 m long, with swollen 'joints' occasionally below furcation of branch. Primary branch systems ovate to broadly elliptic in mature specimens, but branches straggly, interwoven and outline obscured; secondary branches elliptic-lanceolate; tertiary branches 1- to 3-furcate, 10–15 mm long. Leaves heteromorphic: median leaves lanceolate or ovate-lanceolate, 2,5 mm long, apex acute, base cordate, unequal, margins sparsely toothed; lateral leaves sessile, linear-elliptic, 3–4  $\times$  0,75–1,5 mm, subdimidiate

MAP 16.—*Selaginella kraussiana*

with a pale median line, apex acuminate, margins serrate; axillary leaves similar to lateral leaves, but wider. Strobili infrequently formed at apex of ultimate branches, 0,5–0,8 mm long, maturing simultaneously throughout secondary branch; sporophylls undifferentiated, similar to median leaves but narrower. *Megaspores* reticulate with thin narrow wings, c. 750  $\mu$ m. *Microspores* echinate, 26 – 32  $\mu$ m, bases of spines joined to form ridges. Fig. 6: 1.

South-western Cape Province to Transkei, Natal, Swaziland, Transvaal, Zimbabwe, Mozambique, Malawi, Angola, Zaire, Tanzania, Uganda, Kenya, Ethiopia, Sudan, Madeira, Fernando Po and the Azores. *S. kraussiana* has been introduced to Hermanus in south-western Cape Province. On forest floors in deep shade, 1 200–2 500 m. Map 16.

Vouchers: Compton 24934, 25917 (NBG); Cooper 1406 (BM; K; NH; PRE); Moll 835 (NU); Schlechter 4425 (BM; BOL; GRA; K); Tyson 2136 (BOL; K; STE).

7. *Selaginella mittenii* Bak. in J. Bot., Lond. 21: 18 (1883); Jermy in F.Z. Pterid: 26 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 145, t. 88 (1983). Type: Tanzania, Usagura Mountains, Hannington s.n. (K, holo.!–BOL, photo.!).

*Selaginella mackenii* Bak. in J. Bot., Lond. 22: 89 (1884); Sim, Ferns S. Afr. edn 2: 338 (1915). Type: Natal, Tugela River, Gerrard & McKen 237 (K, holo.!–BOL, photo.!).

*Selaginella cooperi* Bak. in J. Bot., Lond. 22: 89 (1884); Sim, Ferns S. Afr. edn 2: 338 (1915). Type: Orange Free State, Cooper 1056 (K, holo.!–BOL, photo.!).

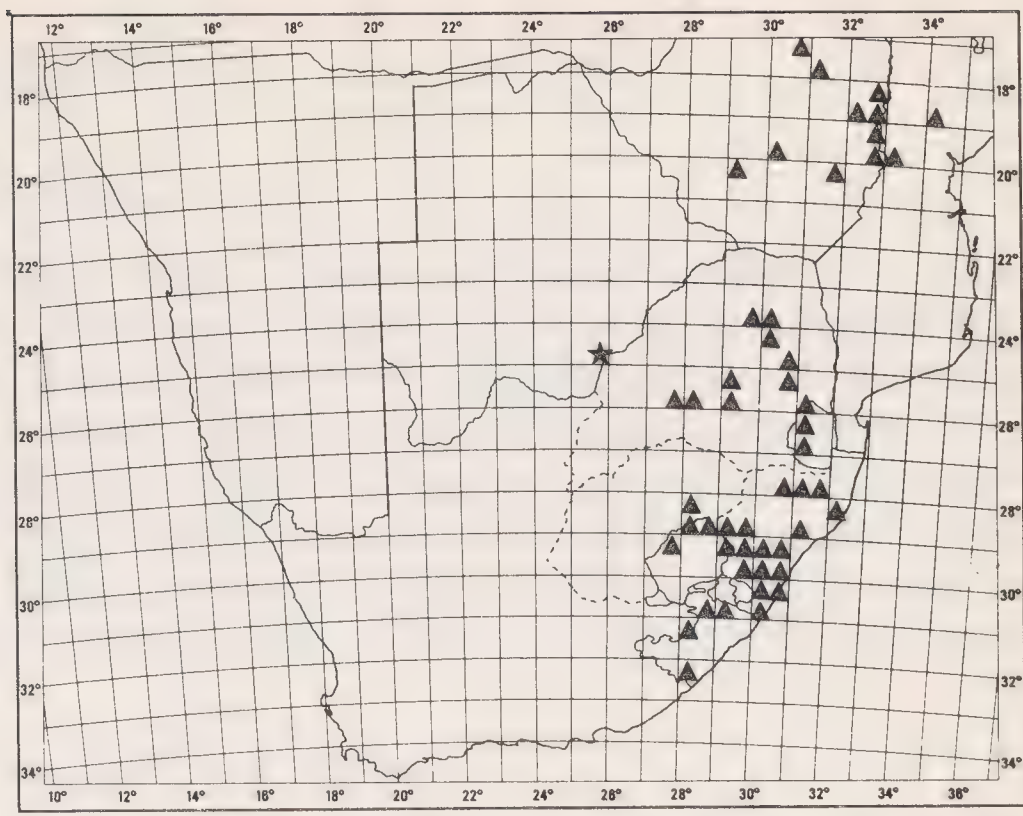
*Selaginella tectissima* Bak. in J. Bot., Lond. 22: 89 (1884); Sim, Ferns S. Afr. edn 2: 337 (1915). Type: Transvaal, Magaliesberg, Sanderson s.n. (K, holo.!–BOL, photo.!).



*Selaginella depressa* sensu Sim, Ferns S. Afr. edn 2: 334 t. 168C (1915), non Spring (1843).

Plant creeping, often forming interwoven mats. Stems 10–120 mm long, branches all  $\pm$  distant, those of secondary order 3- to 8-furcate, divaricate; ultimate branches 0,3–0,8 mm long. Leaves heteromorphic: median leaves ovate-lanceolate, acute or acuminate, 0,5–0,75 mm long, margins bordered with hyaline cells, dentate; lateral leaves ovate-elliptic, 1,25–1,75  $\times$  0,75–1 mm, apex acute, rounded, base unequal, uppermost lobe amplexicaul, margins dentate, becoming ciliate basally with a narrow hyaline border, the whole when dry characteristically ensheathing stem. Strobili erect at apex of ultimate branches, maturing simultaneously throughout branch system, female basally, male above; sporophylls undifferentiated, similar to median leaves. Megaspores subrugulose, scabrate, 250–300  $\mu$ m; triradiate ridge shallow. Microspores verrucate, 34–50  $\mu$ m. Fig. 5:3.

Eastern Cape Province, Transkei, Natal, Lesotho, Orange Free State, Swaziland, Transvaal, Zimbabwe, Mozambique, Malawi, Angola, Zaire, Tanzania, Uganda and Sudan. In grassland around bases of boulders, 540–1 600 m. Map 17.



MAP 17.—▲ *Selaginella mittenii*  
★ *Selaginella njam-njamensis*

Vouchers: Burrows 1396 (BOL; NBG); Pegler 893 (BOL; PRE); Schlechter 3211 (BM; BOL; GRA; K); Thode s.n. (STE 5376); Ward 2626 (NPB; NU).

Very close in leaf and spore characters to *S. cathedri-folia* Spring from West Africa but differs in habit, texture and shape of lateral leaves.







## ISOETALES

## ISOETACEAE

Aquatic plants or plants of seasonally flooded or boggy ground. *Rhizomorph* short, 2- or 3-lobed. *Leaves* in a rosette, terete or subterete often becoming flattened below; leaf base spatulate, imbricate with membranous margin and a delicate deltate ligule on the adaxial surface at the point where the leaf narrows (labium also sometimes present). Heterosporous; *megaspores* often of 2 sizes, trilete, with conspicuous triradiate and equatorial ridges; *microspores* monolete, frequently with a conspicuous apical ridge, in septate sporangia sunken into separate leaf bases, with velum (membranous tissue covering sporangia) entire, with a large or small aperture or absent. Megagametophyte developing within the spore wall; sporophytic stage of life-cycle frequently achieved without fertilization by male gamete (apogamy).

A family comprising only the widespread genus *Isoetes* (Tryon & Tryon, 1982).

## ISOETES

*Isoetes* L., Sp. Pl. 1100 (1753); Gen. Pl. edn 5: 486 (1754); Engl., Pflanzenw. Afr. 2: 80 (1908); Alston in Mém Inst. fr. Afr. noire 50: 46 (1957); in F.W.T.A. edn 2, Suppl. 12 (1959); Tardieu-Blot in Fl. Camer. 3: 18 (1964); Launert in F.S.W.A. 1:1 (1969); Schelpe in F.Z. Pterid.: 30 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 17 (1973); in C.F.A. Pterid.: 31 (1977). Type species: *I. lacustris* L.

Description as for family.

A genus with about 75 temperate and tropical species.

- 1a Megaspores almost smooth..... 3. *I. transvaalensis*
- 1b Megaspores distinctly ornamented:
  - 2a Megaspores reticulate or foveolate:
    - 3a Perennially submerged aquatic plant; leaves flat apically, not twisted, longer than 220 mm (eastern Cape Province); megaspores foveolate..... 5. *I. wormaldii*
    - 3b Seasonally submerged aquatic plant; leaves filiform, usually weakly spirally twisted (south-western Cape Province), less than 200 mm long; megaspores reticulate ..... 6. *I. stellenbossiensis*
  - 2b Megaspores tuberculate or verrucate:
    - 4a Velum present:
      - 5a Velum complete:
        - 6a Distal face of megaspore with verrucae and anastomosing tubercles; spore wall between tubercles of a fine fibrous matrix ..... 1. *I. capensis*
        - 6b Distal face of megaspore with discrete tubercles often crowded but not coalescing; spore wall between tubercles of open fibres of a spicular nature ..... 2. *I. perrieriana*
      - 5b Velum incomplete, distal face of megaspore with tubercles discrete or anastomosing ..... 4. *I. aequinoctialis*
    - 4b Velum absent:
      - 7a Distal face of megaspores with well-spaced papillae arising from an even-textured spore wall; proximal face with a small central group of tubercles; sporophylls longer than 250 mm long ..... 8. *I. schweinfurthii*
      - 7b Distal face of megaspores verrucate or with often crowded papillae of unequal size arising from a rugulose or uneven spore wall; proximal face with a central cluster of verrucae; sporophylls usually less than 200 mm long..... 7. *I. welwitschii*

1. *Isoetes capensis* Duthie in Trans. R. Soc. S. Afr. 17: 330, t. 11 fig. 3, t. 12 figs 1, 2 (1929); W. B. G. Jacobsen, Ferns Sthn Afr. 156, t. 101 (1983). Type: Cape Province, Cape Peninsula, temporary vleis, Duthie s.n. in Stell. Distr. Herb. 2001 (STE, lecto.!: BM!; K!; NBG!; NH; PRE!; PRU!).

Rhizomorph up to 11 mm in diameter; *rhizomorph-scales* deltate, more or less equal-sided, horny, black-brown, sometimes ligulate with abortive sporangia. *Sporophylls* 5–35 in number, slender, up to 190 mm long, broadening below into sheathing base and tapering gradually towards apex, membranous wing nar-



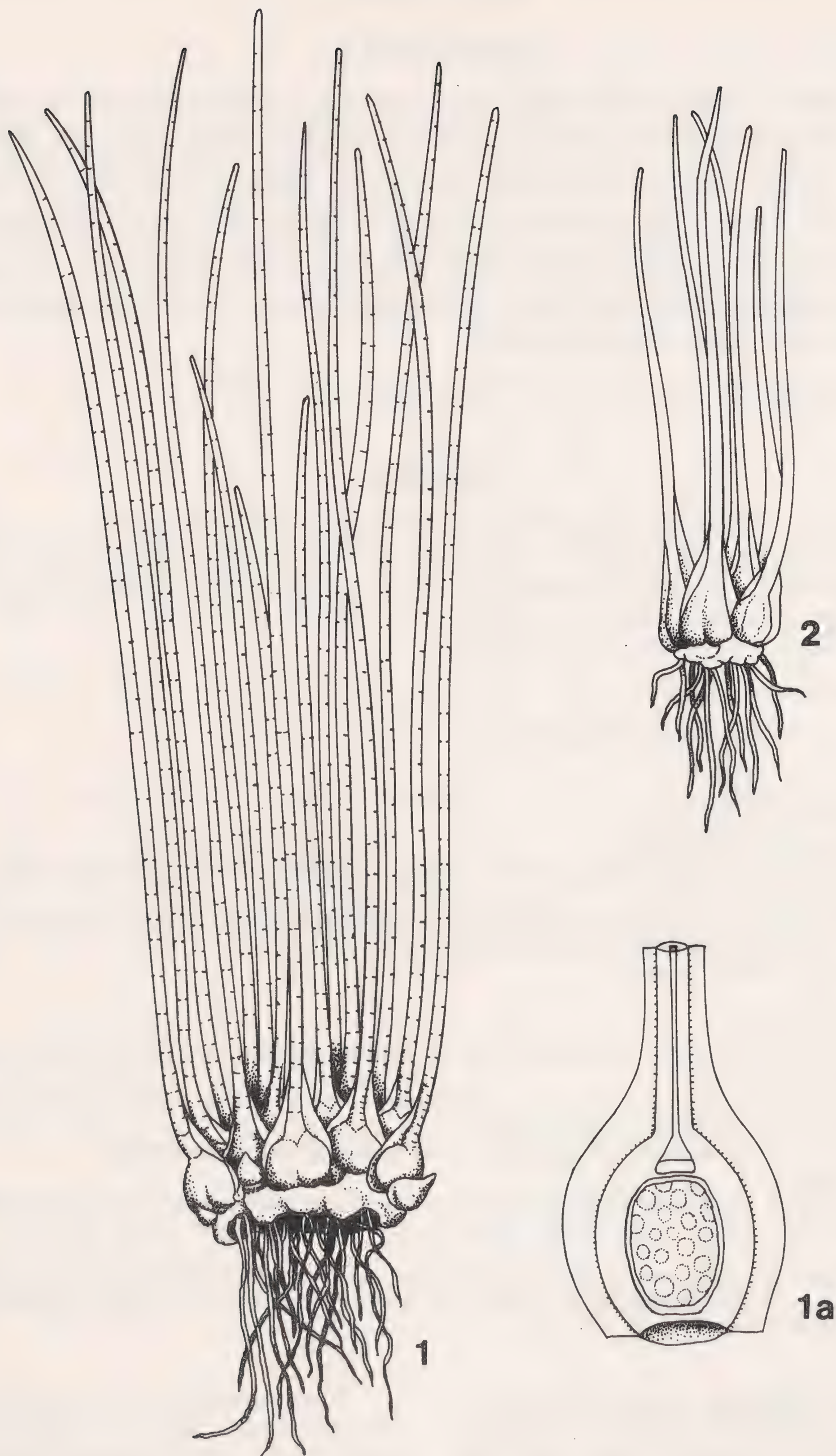


FIG. 7.—1, *Isoetes schweinfurthii*, whole plant,  $\times 0,66$ ; 1a, inner face of sporophyll showing megasporangium,  $\times 48$  (after F.Z. Pteridophyta, tab. 6, 1 & 2, with permission of the Managing Committee). 2, *Isoetes capensis*, whole plant,  $\times 1$  (Schelpe 4980).



row; *ligule* cordate-deltate *Sporangium* with complete velum. *Megaspores* white or grey, darkening on moistening, sculpturing very variable, usually rough with scattered or coalescing tubercles, in the latter case forming an incomplete or complete reticulum, 390–615  $\mu\text{m}$ . *Microspores* brownish, 20–30  $\mu\text{m}$ , spinose, spines sparsely or densely crowded, 3  $\mu\text{m}$  long. Fig. 7: 2; 8: 1.

Rhizomorph trilobed.....1 (a). var. *capensis*  
Rhizomorph bilobed.....1 (b). var. *stephansenii*

### 1 (a). var. *capensis*.

Endemic to south-western Cape Province. Seasonally submerged in vleis during winter. Map 18.

Vouchers: *Boucher* 2570, 2571 (STE); *Levy* 4454 (BOL); *Schelp* 4980 (B; BOL; GH; K; M; MO; P; PRE; S; US); *Strauss* 27 (NBG).

1 (b). var. *stephansenii* (*Duthie*) *Schelp* & N. C. *Anthony* in *Bothalia* 15: 555 (1985). Type: Cape Province, Stellenbosch Flats, *Duthie* s.n. in Stell. Distr. Herb. 2005 (STE, lecto.!, BM!; BOL!; K!; NBG!; PRE!; PRU!).

*Isoetes stephansenii* *Duthie* in *Trans. R. Soc. S. Afr.* 17: 330 (1929).

So far only found on the flats around Stellenbosch in south-western Cape Province. Seasonally submerged in vleis during winter. Map 18.

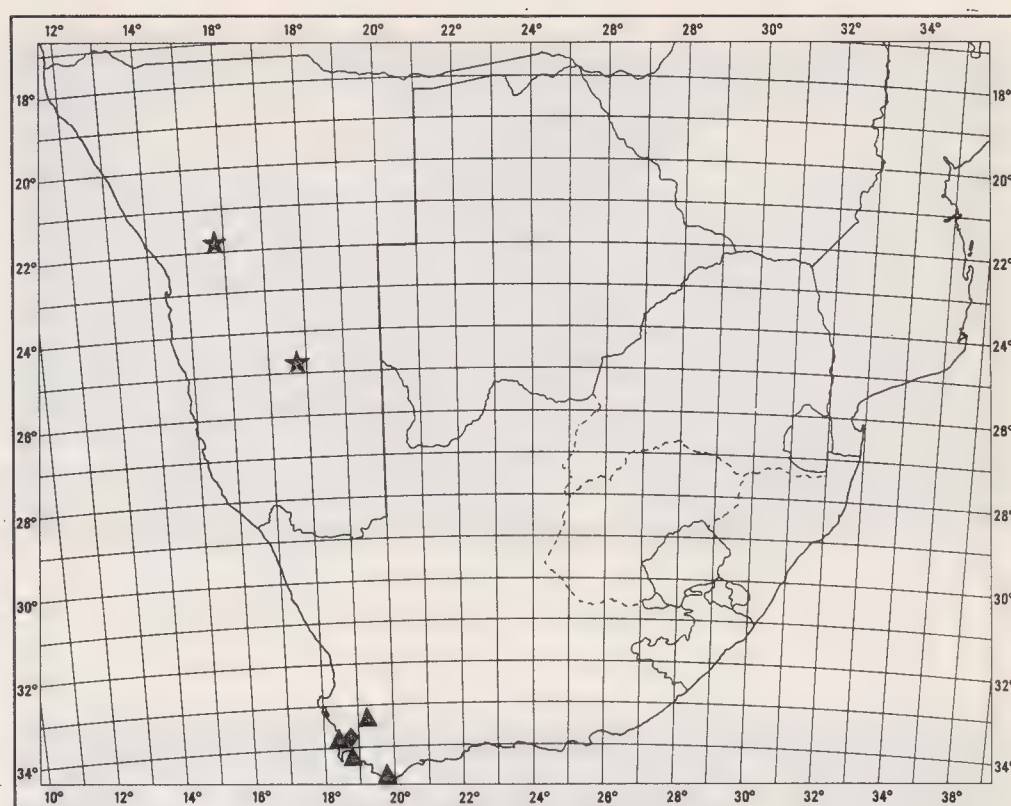
Voucher: *Schelp* 4976 (BOL).

2. *Isoetes perrieriana* *Iversen* in *Dansk bot. Ark.* 7: 200 (1932); W. B. G. *Jacobsen*, *Ferns Sthn Afr.* 156 (1983). Type: Madagascar, near Antsirabe, *P. de la Bathie* 18486 (BM, holo.!, P!).

*Isoetes giessii* *Launert* in *Mitt. bot. StSamml., Münch.* 2: 309 (1957). Type: South West Africa/Namibia, Gibeon District, Haribes, *Volk* 12323 (M, holo.!, BM!; BOL!).

Rhizomorph bilobed, 7–10 mm in diameter; *rhizomorph-scales* infrequent in specimens seen, deltate, more or less equal-sided, cuspidate, dull brown, horny with scarious margins. *Sporophylls* 14–25 in number, c. 30–80  $\times$  1–1,3 mm, with wide scarious margins on lower quarter; *ligule* small, deltate, apex acute, base cordate, c. 1,4  $\times$  1,3 mm. *Sporangium* with complete velum, elliptic or ovate, c. 3–4  $\times$  1,5–2,2 mm. Immature *megaspores* white, maturing grey, with prominent tubercles, short and verrucate, not at all reticulate, 380–460  $\mu\text{m}$ . *Microspores* muricate-scabrid, c. 35  $\mu\text{m}$ . Fig. 8: 2.

South West Africa/Namibia and Madagascar. Seasonally submerged in vleis during summer. Map 18.



MAP 18.—▲ *Isoetes capensis* var. *capensis*  
◆ *Isoetes capensis* var. *stephansenii*  
★ *Isoetes perrieriana*

Vouchers: *Giess, Volk & Bleissner* 5564 (BR; M; S; WIND); *Volk* 12323 (BM; BOL; M); *Wanntorp* 915 (BM; PRE; S; WIND).

3. *Isoetes transvaalensis* *Jermy & Schelp* in *Contr. Bolus Herb.* 10: 150 (1982). Type: Transvaal, Blaauwberg summit, *Van der Schijff* 5463 (BM, holo.!, BOL!; PRU!).

Rhizomorph trilobed, less than 10 mm in diameter; *rhizomorph-scales* broadly deltate, becoming trilobed and cuspidate, black-brown, nitid, with scarious margins. *Sporophylls* c. 30–160  $\times$  1–2 mm (when dry), tapered gradually to an acute apex, base broadly deltate with scarious margins 1 mm broad extending up to 20 mm along lamina; *ligule* flabellate, broader than long, labium shorter than ligule. *Sporangium* with complete velum, oblong-ovate, up to 4  $\times$  2,5 mm. *Megaspores* coal-black when moist, greyish when dry, almost smooth on distal and proximal faces, 390–500  $\mu\text{m}$ . *Microspores* faintly granular, 28–32  $\mu\text{m}$ . Fig. 8: 3.

Natal, Lesotho, Orange Free State and Transvaal. In rock pools in sandstone; submerged during summer, dry during winter. Map 19.

Vouchers: *Hilliard* 5531 (BM; BOL; E; NU); *Jacot Guillarmod* 7176 (BM; BOL; RUH); *Strey & Schlieben* 11606 (PRE).

4. *Isoetes aequinoctialis* *Welw. ex A. Br.* in *Kuhn, Fil. Afr.* 195 (1868); *Jermy* in *F.Z. Pterid.* 30 (1970); *Schelp & Jermy* in *C.F.A. Pterid.* 31 (1977); W. B. G. *Jacobsen*, *Ferns*



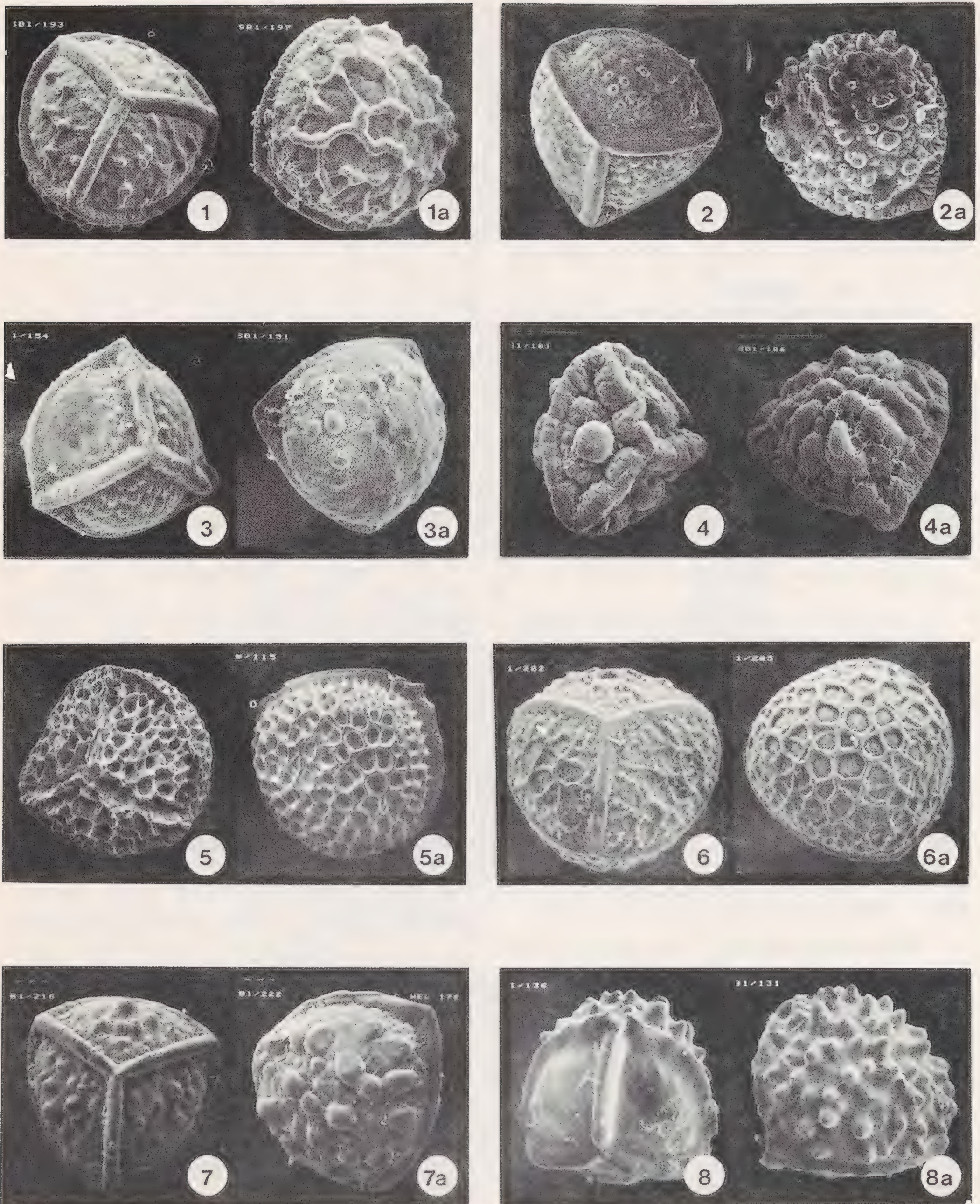


FIG. 8.—Megaspores of *Isoetes* species (all  $\times 55$ ): 1, *I. capensis*, proximal face; 1a, distal face. 2, *I. perrieriana*, proximal face; 2a, distal face. 3, *I. transvaalensis*, proximal face; 3a, distal face. 4, *I. aequinoctialis*, proximal face; 4a, distal face. 5, *I. wormaldii*, proximal face; 5a, distal face. 6, *I. stellenbossiensis*, proximal face; 6a, distal face. 7, *I. welwitschii*, proximal face; 7a, distal face. 8, *I. schweinfurthii*, proximal face; 8a, distal face [All courtesy of the British Museum (Natural History)].



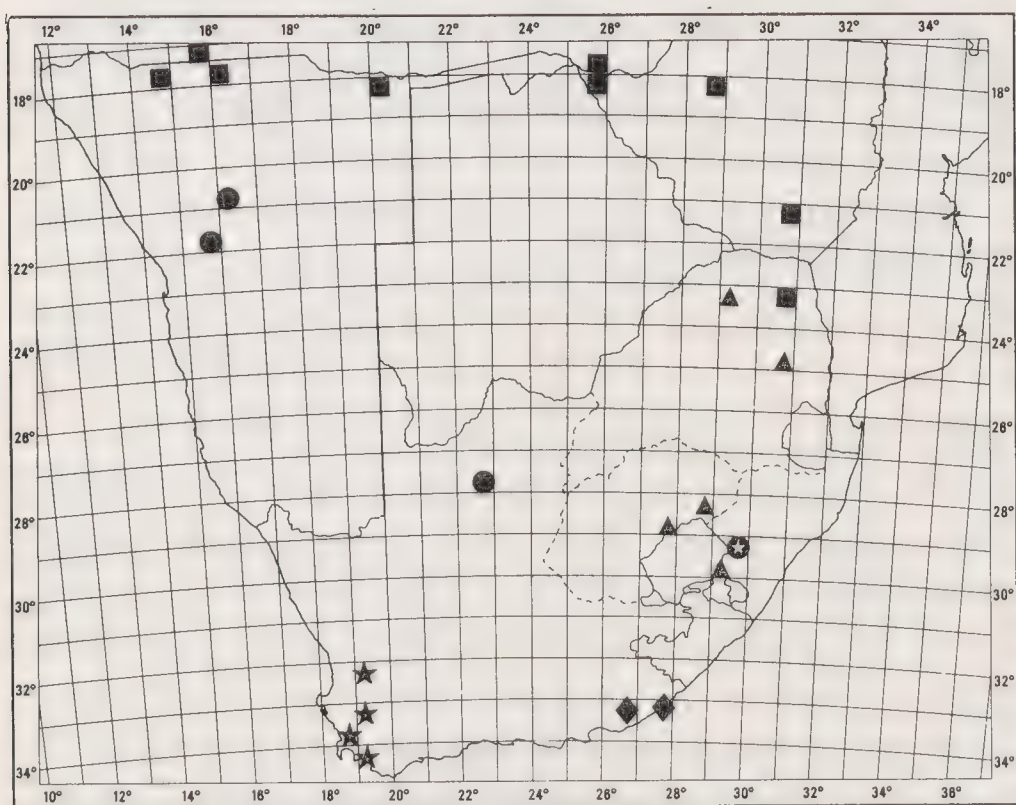
Sthn Afr. 155, t. 99 (1983). Type: Angola, between Pungo Andongo and Sansamanda, near R. Cuanza, *Welwitsch* 50 (B, holo.; BM; K!; LISU!).

*Calamaria aequinoctialis* (Welw. ex A. Br.) Kuntze, Rev. Gen. 2: 828 (1891–3).

*Isoetes erongoensis* Wanntorp in Svensk bot. Tidskr. 64: 150 (1970). Type: South West Africa/Namibia, Karibib District, 'Ameib', c. 25 km north-east of Usakos, Wanntorp 992 (S, holo.).

Rhizomorph trilobed, 4–10 mm in diameter; *rhizomorph-scales* thin, papery, brownish, often absent. *Sporophylls* 10–20, more or less trigonous, pale green, stiff,  $40\text{--}350 \times 1\text{--}1.5$  mm, apex abruptly pointed, with a broad membranous margin (soon disappearing) c. 3 mm wide basally (above sporangia); *ligule* often trilobed, deltate, attenuate. *Sporangium* protruding either side of midrib on adaxial side of sporophyll, c.  $3\text{--}7 \times 1.5\text{--}3$  mm, velum covering lower half of sporangium or reduced to a marginal ring less than 1 mm wide. *Megaspores* greyish when dry, proximal faces very finely granular or with a central cluster of minute verrucae, distal face with more or less widely spaced papillae or granules, of two sizes, c.  $350 \mu\text{m}$  and  $500 \mu\text{m}$ . *Microspores* scabrate,  $28\text{--}40 \mu\text{m}$ . Fig. 8: 4.

Angola, South West Africa/Namibia, northern Cape Province, Zimbabwe, Zambia, Tanzania, Ghana and Mali. Seepage areas; wet in summer. Map 19.



MAP 19.—▲ *Isoetes transvaalensis*  
● *Isoetes aequinoctialis*  
◆ *Isoetes wormaldii*  
★ *Isoetes stellenbossiensis*  
☆ *Isoetes welwitschii*  
■ *Isoetes schweinfurthii*

Vouchers: *Giess* 15243 (WIND); *Pocock* 20013 (BOL).

5. *Isoetes wormaldii* Sim in Trans. S. Afr. phil. Soc. 16: 299, t. 5 (1906), Ferns S. Afr. edn 2: 340, t. 185 (1915); W. B. G. Jacobsen, Ferns Sthn Afr. 152, t. 96 (1983). Type: Cape Province, East London, Sim 1567 (NBG, lecto.; BM; BOL!; PRE!).

Rhizomorph trilobed, c. 20 mm in diameter; *rhizomorph-scales* absent and sporophyll bases not persistent. *Sporophylls* 5–70 in number, ligulate-terete or somewhat flattened, less than 500 mm long and 2–3 mm wide, abruptly ending in a rounded point, winged narrowly only at very base around the oblong sporangium; *ligule* somewhat elongate. *Sporangium* lacking velum,  $2.5\text{--}10 \times 2\text{--}5$  mm. *Megaspores* white, tubercular, reticulate on all faces,  $400\text{--}640 \mu\text{m}$ . *Microspores* minutely tuberculate,  $24\text{--}35 \times 20\text{--}24 \mu\text{m}$ . Fig. 8: 5.

Endemic to eastern Cape Province. Perennially submerged in slow-flowing rivers. Map 19.

Vouchers: *Jacot Guillarmod* 4007B (PRE); Sim s.n. (BOL; K; PRE).

6. *Isoetes stellenbossiensis* Duthie in Trans. R. Soc. S. Afr. 17: 328, t. 2, 3, 7; t. 11 figs 1, 2 (1929); W. B. G. Jacobsen, Ferns Sthn Afr. 156, t. 100 (1983). Type: Cape Province, Stellenbosch Flats, Duthie s.n. in Stell. Distr. Herb. 2004 (STE, lecto.; BM!; BOL!; K!; NBG!; PRE!; PRU!).

Rhizomorph trilobed, up to 15 mm in diameter; *rhizomorph-scales* 4–5 mm wide, dull black usually tricuspidate. *Sporophylls* 5–33 in number, 15–120 mm long, abruptly dilated into a spoon-shaped or orbicular base 4–7 (–10) mm wide, often horny and persistent, with a broad scarious margin 1 mm wide which extends 10–15 mm up the leaf; apex blunt; *ligule* small, delicate, elongate-deltate, sometimes cordate basally. *Sporangium* lacking velum, variable in shape and size, the older megasporangium often circular, the younger oval or elliptical; microsporangium conspicuously punctate. *Megaspores* globose, greenish grey at maturity, darkening on moistening, distal face conspicuously reticulate, reticulations often less regular along equatorial ridge and proximal faces, c.  $500 \mu\text{m}$ . *Microspores* brown, spinulose,  $32\text{--}36 \times 16\text{--}24 \mu\text{m}$ . Fig. 8: 6.

Endemic to south-western Cape Province. In shallow seasonal vleis, wet in winter. Map. 19.



Vouchers: *Boucher* 2501 (STE); *Hafstrom & Acocks* 5452 (PRE); *Levy* 3010 (BOL; K); *Roux* 182 (NBG).

7. *Isoetes welwitschii* A. Br. ex Kuhn, Fil. Afr. 196 (1868); in Mber. Ges. naturf. Freunde Berl. 1867: 7 (1867), nom. nud.; Schelpe & Jermy in C.F.A. Pterid.: 32 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 154 (1983). Type: Angola, Morro de Lopollo, *Welwitsch* 166 (B, holo.!; BM!–BOL, photo.!; K!; LISU!).

*Calamaria welwitschii* (A. Br. ex Kuhn) Kuntze, Rev. Gen. 2: 282 (1891–3).

*Isoetes natalensis* Bak., Fern Allies 132 (1887); Sim, Ferns S. Afr. edn 2: 340, t. 184 fig. 2 (1915). *Calamaria natalensis* (Bak.) Kuntze, Rev. Gen. 2: 828 (1891–3). Type: Natal, Estcourt, Griffins Hill, *Rehmann* 7296 (K, holo.!; BM!; P!).

Rhizomorph trilobed, up to 6 mm in diameter; *rhizomorph-scales* short (2–3 × 5–7 mm), deltate-cuspidate, black-brown, subnitid. *Sporophylls* 7–20, very slender, up to 75 mm long, broadened gradually into an ovate base 4 mm broad, apex tapered to a blunt tip; *ligule* broadly deltate. *Sporangium* lacking velum, suborbicular, up to 2.5 × 2 mm. *Megaspores* with strong triradial ridges, distal face with clavate, truncate tubercles and similar papillae between, proximal faces with few to many short, discrete tubercles, 450–560 µm. *Microspores* scabrid, c. 25 µm. Fig. 8: 7.

Angola, Natal, Madagascar, Kenya, Ethiopia, Eritrea, Ubungui, Ghana, Nigeria and Sudan. Only known in our area from the Estcourt District of Natal, probably in seepage areas, wet in summer. Map 19.

Vouchers: The type of *I. natalensis* has been the only specimen found in our area.

8. *Isoetes schweinfurthii* A. Br. in Bak., J. Bot., Lond. 18: 108 (1880); W. B. G. Jacobsen, Ferns Sthn Afr. 153 (1983). Type: Sudan, Sériba Ghattas, *Schweinfurth* 1962 (B, lecto.!; BM!; FI!; K!; P!).

*Calamaria schweinfurthii* (A. Br. in Bak.) Kuntze, Rev. Gen. 2: 828 (1891–3).

*Isoetes rhodesiana* Alston in Bolm Soc. broteriana, sér. 2, 30: 17 (1956); Jermy in F.Z. Pterid.: 30 (1970). Type: Zimbabwe, Nyamandhlovu District, Bongola, *West* 30263 (BM, holo.!; K; SRGH).

*Isoetes alstonii* Reed & Verdc. in Kirkia 5: 19 (1965); Launert in F.S.W.A. 1: 1 (1969); Jermy in F.Z. Pterid.: 30, t. 6 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 154, t. 98 a & b (1983). Type: Zimbabwe, Victoria Falls, *Greenway & Brenan* 8012 (EA, holo.!; BM!; K!; PRE!).

*Isoetes kersii* Wanntorp in Svensk bot. Tidskr. 64: 146 (1970). Type: South West Africa/Namibia, Ondangua-Ruacana Falls, c. 8 km west of Eunda, *Kers* 1389 (S, holo.!).

Rhizomorph trilobed, less than 15 mm in diameter; *rhizomorph-scales* horny, nitid, blackish brown, deltate, often elongate-cuspidate. *Sporophylls* up to 40 in number, erect to lax, up to 110–400 (–600) mm long, abruptly narrowed from an orbicular base, up to 14 mm broad, bases often persistent, horny; apex gradually tapered to a fine point; *ligule* deltate. *Sporangium* lacking velum, oblong-obovate, orbicular, 7–12 × 6–8 mm. *Megaspores* with prominent discrete rounded tubercles on distal face, proximal faces almost smooth or with a group of few or many tubercles, 375–560 µm. *Microspores* alate. Fig. 7: 1; 8: 8.

Angola, South West Africa/Namibia, Transvaal, Zimbabwe, Mozambique, Zambia, Tanzania, Sudan, Central African Republic, Ivory Coast, Senegal, Morocco and Madagascar. Submerged in semi-permanent deep vleis. Map 19.

Vouchers: *Giess* 7615 (BOL; M; NBG; WIND); *Van der Schijff* 2856 (PRE).



## EQUISETALES

## EQUISETACEAE

Terrestrial plants. *Aerial stems* erect, hollow, ribbed, arising from creeping subterranean rhizomatous stems and producing whorls of branches at nodes. *Leaves* reduced to a many-toothed short sheath at each node. *Sporangiophores* stalked, peltate, hexagonal, arranged in compact strobili, terminal on stems or branches; *sporangia* numerous, borne on adaxial surface (lower surface) of peltate heads of sporangiophores, homosporous. *Gametophytes* chlorophyllose, thal-  
loid.

## EQUISETUM

**Equisetum** L., Sp. Pl. 1061 (1753); Gen. Pl. edn 5: 484 (1754); Engl., Pflanzenw. Afr. 2: 70 (1908); Schelpe in F.Z. Pterid.: 32 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 19 (1973); in C.F.A. Pterid.: 32 (1977). Lectotype species: *E. arvense* L.

Description as for family.

The only living genus of the family with about 25 species mostly occurring in the temperate regions of the world (except for Australasia), only one of which occurs in tropical and Southern Africa.

**Equisetum ramosissimum** Desf., Fl. Atlant. 2: 398 (1799); Sim, Ferns S. Afr. edn 2: 343, t. 174 (1915); Schelpe in F.Z. Pterid.: 32, t. 7 (1970); in C.F.A. Pterid.: 32 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 158, t. 102 (1983). Type: Tunisia, Jebel Zaghouan, *Desfontaines* s.n. (P, holo.).

*Hippochaete ramosissimum* (Desf.) Boern., Fl. Deutsche Volk 282 (1912).

*Equisetum thunbergii* Wikstr. in K. svenska VetenskA-  
kad. Handl. 2: 4 (1821). Type: Cape Province, ?Uitenhage, *Thunberg* s.n. (UPS, holo.).

*Equisetum burchellii* Vauch., Mon. Prêles 47, t. 10 (1822), reimpr. in Mém. Soc. Phys. Hist. nat. Genève 1: 375 (1822). *Equisetum ramosissimum* var. *burchellii* (Vauch.) Milde, Mon. Equis. 443 (1865); Carr., Cat. Afr. Pl. Welw. 2: 279 (1901). Type: Cape Province, Kuruman, *Burchell* s.n. (K, ?iso.).

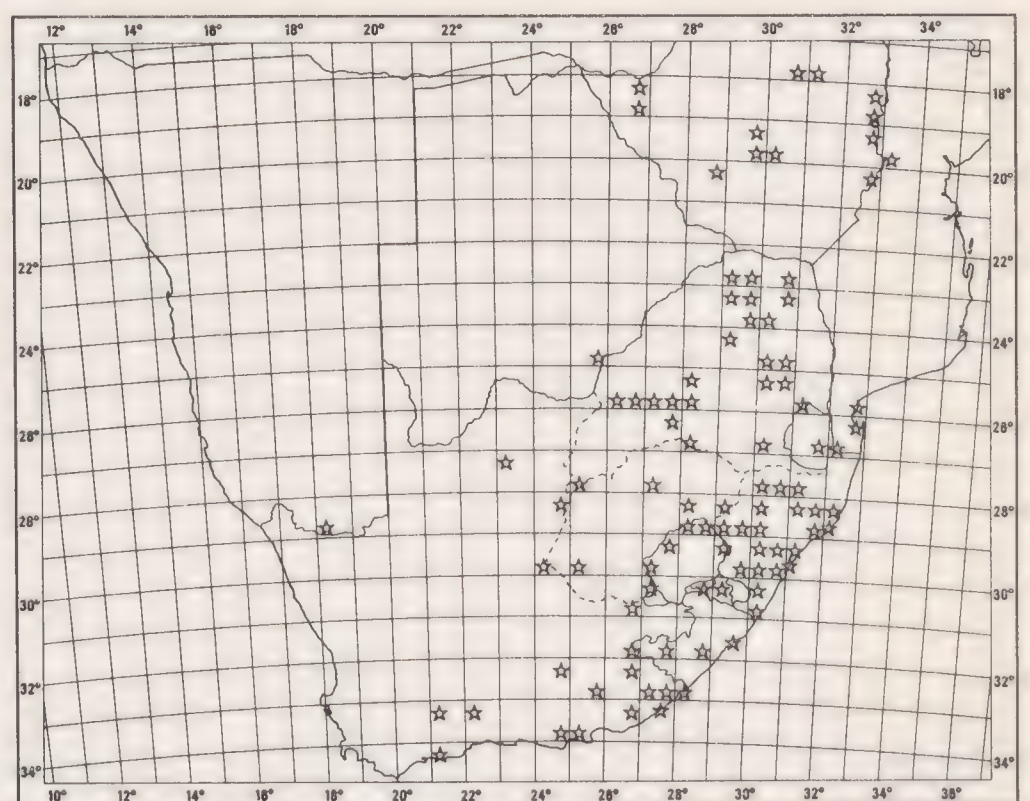
*Equisetum multiforme* Vauch., Mon. Prêles 51 (1822), reimpr. in Mém. Soc. Phys. Hist. nat. Genève 1: 379 (1822), nom. illeg.

Subterranean stems horizontal to erect, black, up to 8 mm in diameter, bearing roots. *Aerial stems* up to 2 m high with primary axis erect, conspicuously longitudinally ribbed, up to 5 mm in diameter with whorls of up to 14 scale leaves up to 11 mm long, fused for most of their length, ending in free acuminate teeth up to 2 mm long, often turning black with age, apical portions frequently broken off. *Branches* produced at nodes, up to 14 in each whorl, up to 130 × 1–1.5 mm. *Strobili* up to 23 × 8 mm, with a blunt conical apex; *sporangiphores* 1–1.5 mm in diameter. Fig. 1: 2.

Southern South West Africa/Namibia, Botswana, Cape Province, Transkei, Natal, Lesotho, Orange Free State, Swaziland, Transvaal, Zimbabwe, Mozambique, Angola, Malawi, Zambia, Tanzania, Uganda, Ethiopia, Somalia, Sudan, Morocco, as well as Cape Verde Islands, Canary Islands, Madagascar, Mauritius and Réunion. Open woodland, rock crevices, on sandy soil along rivers and on gravel in shallowly waterlogged places, 100–2 000 m altitude. Map 20.

Vouchers: *Bourquin* 454 (NH; NPB; NU); *Dieterlen* 6 (K; NH; PRE; SAM); *Galpin* 7362 (GRA; PRE); *Schelpe* 4105 (BM; BOL); *Van Jaarsveld* 5974 (BOL; NBG).

An extremely plastic and variable species with a wide distribution range, resulting in the description of numerous different species, varieties or forms. An extensive list of synonyms was given by Hauke (1963).



MAP 20.—*Equisetum ramosissimum*







## OPHIOGLOSSALES

## OPHIOGLOSSACEAE

Terrestrial herbs with globose, subglobose or elongated rhizomes. *Fronde*s few or solitary, stipitate (the stipe bases sometimes persistent), with a simple sterile segment with anastomosing veins, and a simple fertile spike inserted at the base of the sterile segment or on the stipe, with a double row of immersed sporangia in a spike near the apex and sometimes a short or long sterile apiculus extending beyond. *Sporangia* large and thick-walled, each produced from many subepidermal cells, without an annulus, dehiscing by a slit into 2 valves. *Gametophytes* subterranean, tuberous, non-chlorophyllose, mycorrhizal.

## OPHIOGLOSSUM

**Ophioglossum** L., Sp. Pl. 1062 (1753); Gen. Pl. edn 5: 484 (1754); Engl., Pflanzenw. Afr. 2: 68 (1908); Tardieu-Blot in Fl. Madag. 2: 1 (1951); in Mém. Inst. fr. Afr. noire 28: 21 (1953); Pichi-Sermolli in Webbia 9: 625 (1954); Alston in F.W.T.A. edn 2, Suppl. 18 (1959); Tardieu-Blot in Fl. Gabon 8: 28 (1964); in Fl. Camer. 3: 43 (1964); Launert in F.S.W.A. 2: 1 (1969); Schelpe in F.Z. Pterid.: 34 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 21 (1973); in C.F.A. Pterid.: 33 (1977). Lectotype species: *O. vulgatum* L.

Description as for family.

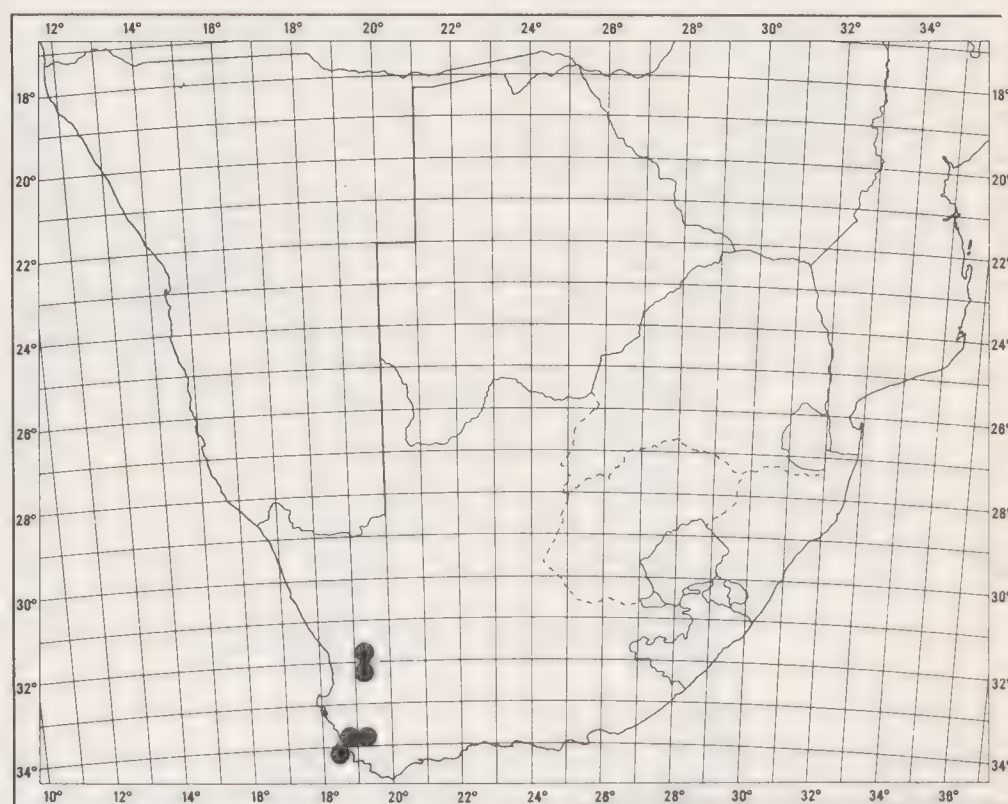
A cosmopolitan genus of about 50 poorly differentiated species. Two tropical species are epiphytic.

- 1a Fertile spike inserted near the base of sterile stipe, sterile and fertile segments apparently free ..... 1. *O. bergianum*
- 1b Fertile spike inserted some distance above base of sterile stipe:
  - 2a Old stipe bases persistent:
    - 3a Fertile spike inserted at base of sterile lamina, wholly above ground level:
      - 4a Sterile lamina less than 30 mm long ..... 2. *O. gomezianum*
      - 4b Sterile lamina more than 30 mm long ..... 3. *O. polyphyllum*
    - 3b Fertile spike inserted some distance below base of sterile lamina, arising below ground level ..... 4. *O. nudicaule*
  - 2b Old stipe bases not persistent:
    - 5a Base of sterile lamina cordate; venation clearly apparent ..... 5. *O. reticulatum*
    - 5b Base of sterile lamina cuneate; venation apparent to obscure:
      - 6a Sterile lamina more than 12 mm broad ..... 6. *O. vulgatum*
      - 6b Sterile lamina less than 12 mm broad ..... 7. *O. lancifolium*

**1. *Ophioglossum bergianum* Schlechtd.**, Adumbr. 10 (1825); Sim, Ferns S. Afr. edn 2: 319, t. 167 fig. 1 (1915); W. B. G. Jacobsen, Ferns Sthn Afr. 161, t. 104 (1983). Type: Cape Peninsula, Lions Head, *Bergius* s.n. (?HAL, holo.).

*Rhizoglossum bergianum* (Schlechtd.) Presl, Suppl. Tent. Pterid. 48 (1845).

Rhizome small, cylindrical, c. 1.5 mm in diameter. *Fronde*s 1–2; *stipe* subterranean, short, usually less than 20 mm long; stipe bases persistent; sterile lamina erect, linear to oblanceolate, c. 23 × 1–70 × 6 mm, acute, not mucronate, base narrowly attenuate; *venation* usually apparent; *fertile spike* inserted near base



MAP 21.—*Ophioglossum bergianum*







of sterile stipe, c. 15–80 mm long, with 3–6 pairs of sporangia and a linear to subulate sterile apiculus as long as or longer than fertile region. Fig. 9: 6 & 7.

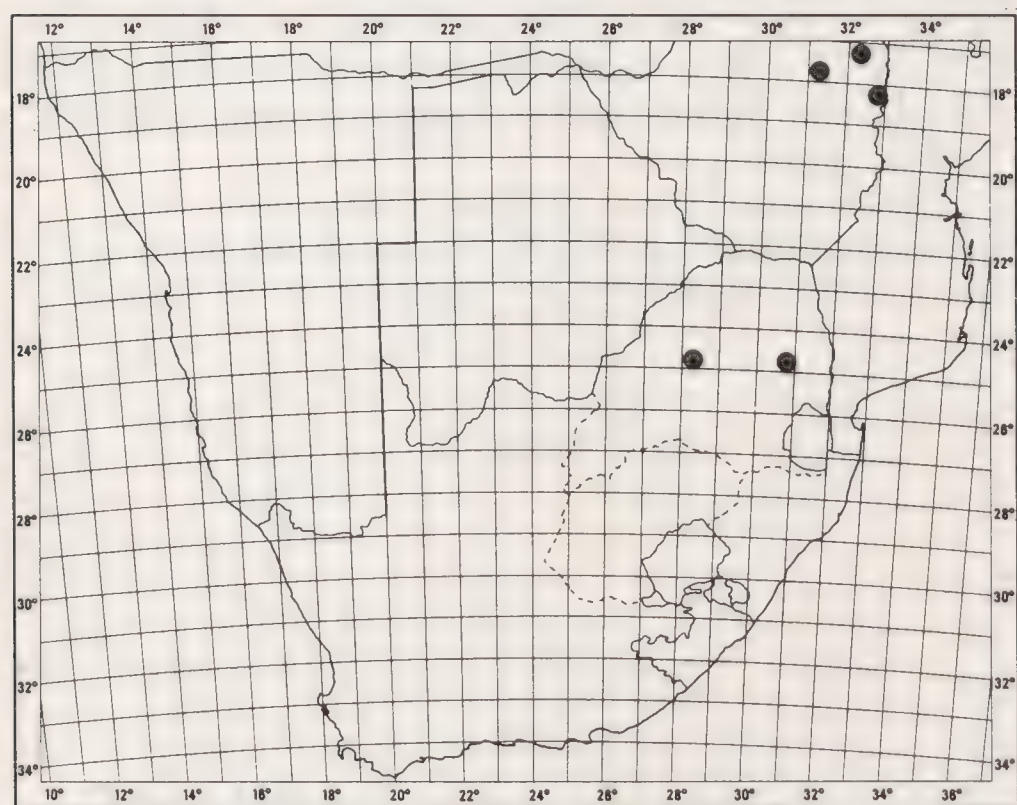
Endemic to south-western Cape Province. On seasonally wet sand, in rock basins and seasonal flushes, 20–650 m altitude. Map 21.

Vouchers: *Bolus* 7235 (BOL; PRE); *Esterhuysen* 27851 (BOL; KMG; PRU); *Schlechter* 10843 (BM; BOL; PRE).

**2. *Ophioglossum gomezianum* Welw. ex A. Br.** in Kuhn, Fil. Afr. 176 (1868); Schelpe in F.Z. Pterid.: 35, t. 8A (1970); in C.F.A. Pterid.: 34, t. 4A (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 160, t. 103 (1983). Type: Angola, Pungo Andongo, *Welwitsch* 35 (BM, lecto.!–BOL, photo.!; K!; LISU!).

Rhizome shortly cylindrical, c. 3 mm long. *Fronde* 1–3; *stipe* subterranean for most of its length, 7–25 mm long; *stipe bases* persistent; *sterile lamina* lanceolate-elliptic to elliptic-ovate, up to 17 × 11 mm or 26 × 8 mm, acute with prominent mucro, base narrowly cuneate; *venation* apparent or not; *fertile spike* inserted at base of sterile lamina, c. 30–90 mm long, with up to 16 pairs of sporangia, apiculus acute, up to 1 mm long. Fig. 9: 8.

Transvaal, Zimbabwe, Angola, Malawi, Zambia, Sudan, Cameroun, Nigeria, Ghana, Ivory Coast, Sierra Leone and Guinea. Damp soil in grassland and on rock outcrops, 470–2 400 m altitude. Map 22.



MAP 22.—*Ophioglossum gomezianum*

Vouchers: *Roberts* 102 (BOL); *Werdermann & Oberdieck* 2008 (PRE).

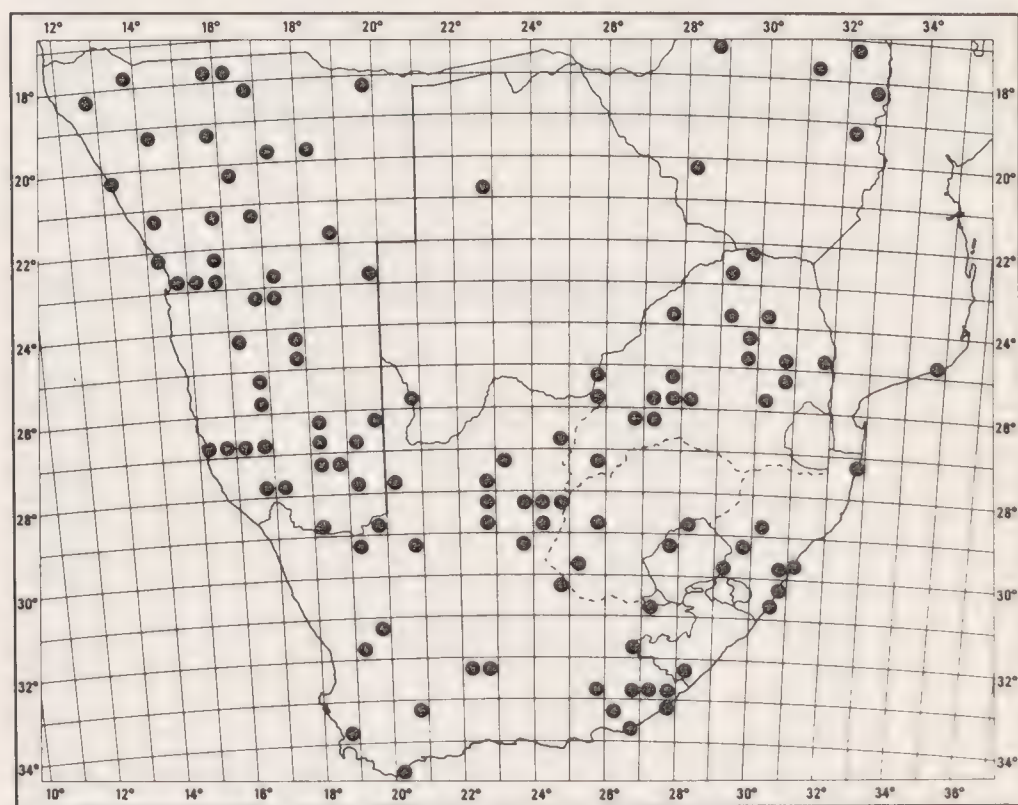
**3. *Ophioglossum polyphyllum* A. Br.** in Seubert, Fl. Azor. 17 (1844), emend. Pichi-Sermolli in *Webbia* 9: 632, t. 2a (1954); Lournert in F.S.W.A. 2: 1 (1969); Schelpe in F.Z. Pterid.: 37 (1970); in C.F.A. Pterid.: 36 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 163, t. 26, 107 (1983). Type: Saudi Arabia, desert near Jeddah, *Schimper* 984 (BM, lecto.!; G; P).

*Ophioglossum vulgatum* var. *polyphyllum* Milde, Fil. Europ. Atlant. 188 (1867), pro parte.

*Ophioglossum capense* var. *regulare* Schlecht., Adumbr. 9, t. 1 fig. 2 (1825), non *O. capense* Swartz (1803). *Ophioglossum regulare* (Schlecht.) C. Chr., Ind. Fil. 472 (1906). Syntypes: Cape of Good Hope, *Mundt & Maire* s.n., *Bergius* s.n.

*Ophioglossum capense* sensu Sim, Ferns S. Afr. edn 2: 321, t. 166 fig. 2 (1915).

Rhizome cylindrical, tapering from c. 3 mm in diameter, up to 40 mm long. *Fronde* 1–3; *stipe* subterranean for c. ½ its length, up to 160 mm long, often with a reddish tinge; *stipe bases* persistent; *sterile lamina* elliptic to oblong-lanceolate, up to 110 × 40 mm, acute to obtuse, mucronate, base broadly cuneate; *venation* apparent to a greater or lesser extent; *fertile spike* inserted at base of sterile lamina, up to 120 mm long, with up to 46 pairs of sporangia, apiculus 1–2 mm long, acuminate. Fig. 9: 2 & 10.



MAP 23.—*Ophioglossum polyphyllum*

FIG. 9.—Whole plants of *Ophioglossum* species, all × 0.6: 1, *O. reticulatum* (*Chase* 6273). 2, *O. polyphyllum* (*Schweickerdt* 2117). 3, *O. vulgatum* (*Chase* 3757). 4, *O. vulgatum* (*Esterhuysen* 25846). 5, *O. nudicaule* (*Guillarmod* 5414). 6 & 7, *O. bergianum* (*Esterhuysen* 29607). 8, *O. gomezianum* (*Roberts* 102). 9, *O. reticulatum* (rootstock, *Dinter* 5492; aerial parts, *Pegler* 825). 10, *O. polyphyllum* (*Schelpe* 4385).



Widespread throughout Southern Africa; also in east tropical Africa, Arabia, Afghanistan and India. Seasonally damp flushes on rock outcrops and in seasonally moist soils, often in semi-arid to arid habitats, 10–1 830 m altitude. Map 23.

Vouchers: *Codd & De Winter* 5075 (PRE); *Compton* 3511 (NBG); *Dinter* 6650 (BM; BOL; K; PRE; SAM); *Giess* 8383 (PRE; WIND); *Strey* 2091 (BOL; PRE).

**4. *Ophioglossum nudicaule* L.f., Suppl. 443 (1781);** Sim, Ferns S. Afr. edn 2: 320, t. 168B (1915); W. B. G. Jacobsen, Ferns Sthn Afr. 162, t. 105 (1983). Type: Cape of Good Hope, *Thunberg*. s.n. (LINN 1243/2, holo.!, UPS!).

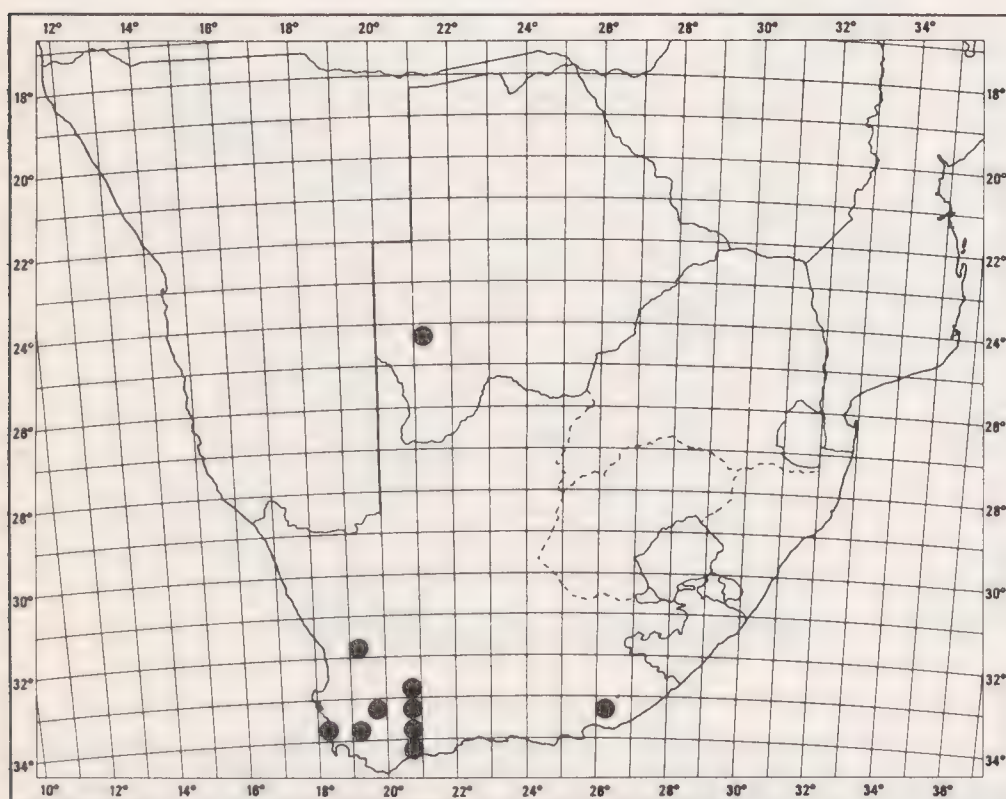
*Ophioglossum capense* var. *nudicaule* (L. f.) Schlechtd., Adumbr. 9 (1825).

*Ophioglossum capense* Swartz in J. Bot., Gött. 1801, 2: 308 (1803). Type as for *O. nudicaule*.

Rhizome cylindrical, 2 mm in diameter. *Fronds* (1–) 2–3; *stipe* subterranean, 2–20 mm long; *stipe bases* persistent; *sterile lamina* held horizontally, somewhat coriaceous, ovate to broadly ovate, up to 80 × 4 mm, mucronate, base cuneate; *venation* usually obscure; *fertile spike* inserted some distance below base of sterile lamina, arising below ground level, c. 7–30 mm long with 2–9 pairs of sporangia, apiculus subulate, attenuate, 1–2 mm long. Fig. 9: 5.

Endemic to Cape Province. In seasonally moist rocky or flat areas, in the open or in scrub, 160–400 m altitude. Map 24.

Vouchers: *Pocock* 30137 (BOL; KMG; NU; PRU; SRGH); *Rourke* 772 (NBG); *Schlechter* 10842 (BM; BOL; K; PRE).



MAP 24.—*Ophioglossum nudicaule*

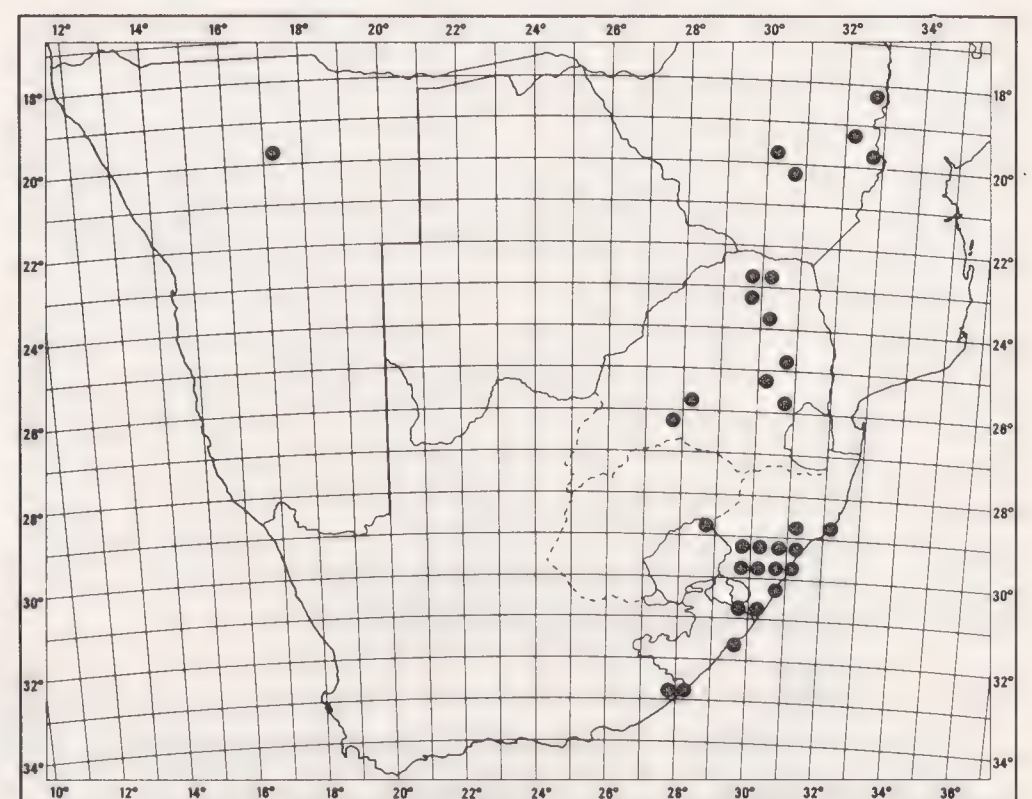
**5. *Ophioglossum reticulatum* L., Sp. Pl. 2: 1063 (1753);** Sim, Ferns S. Afr. edn 2: 322, t. 167 fig. 2 (1915); Launert in F.S.W.A. 2: 2 (1969); Schelpe in F. Z. Pterid.: 37 (1970); in C.F.A. Pterid.: 37 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 165, t. 109 (1983). Iconotype: Plumier, Tractatus de Filicibus Americanus 141, t. 164 (1705)!, from San Domingo.

Rhizome cylindrical, c. 3.5 mm in diameter and 7 mm long. *Fronds* usually 1, less often 2 or 3; *stipe* subterranean for usually less than ¼ its length, c. 90 mm long (up to 300 mm); *stipe bases* not persistent; *sterile lamina* cordate or sometimes almost reniform to broadly ovate, c. 60 × 55 mm, apex obtuse, with or without a small mucro, base cordate to broadly cuneate; *venation* clearly apparent; *fertile spike* inserted at base of sterile lamina, or up to 10 mm below apparent base, up to 180 mm long with up to 45 pairs of sporangia, apiculus narrowly to broadly acute, c. 3 mm long. Fig. 9: 1.

Eastern Cape Province, Transkei, Natal, Transvaal; widespread in tropical Africa. Seasonally wet soils, 500–1 600 m altitude. Map 25.

Vouchers: *Giess* 14934 (PRE; WIND); *Rudatis* 1216 (BM; STE); *Scheepers* 1124 (PRE; PRU); *Strey* 9242 (BOL; PRE).

**6. *Ophioglossum vulgatum* L., Sp. Pl. 2: 1062 (1753);** Schelpe in F.Z. Pterid.: 37 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 164, t. 6, 108 (1983). Type: Europe (LINN 1243/1, holo.!).



MAP 25.—*Ophioglossum reticulatum*



Rhizome cylindrical, 3–4 mm in diameter. *Fronds* usually 1, rarely 3; *stipe* subterranean for less than  $\frac{1}{2}$  its length, 40–180 mm long; *stipe bases* not persistent; *sterile lamina* ovate-oblong, acute, c.  $70 \times 30$  mm, mucronate, base cuneate; *venation* obscure or apparent; *fertile spike* inserted at base of sterile lamina or just below apparent base, up to 180 mm long, with up to 36 pairs of sporangia, apiculus subulate, attenuate, c. 1–2 mm long. Fig. 9: 3 & 4.

Eastern Cape Province, Natal, Lesotho, Orange Free State, Transvaal, Zimbabwe, Malawi, Zambia, Kenya, Tanzania and Liberia; also Europe, Madeira, North America and western Asia (Christensen, 1906). Moist grassland, particularly after fire, 500–2 100 m altitude. Map 26.

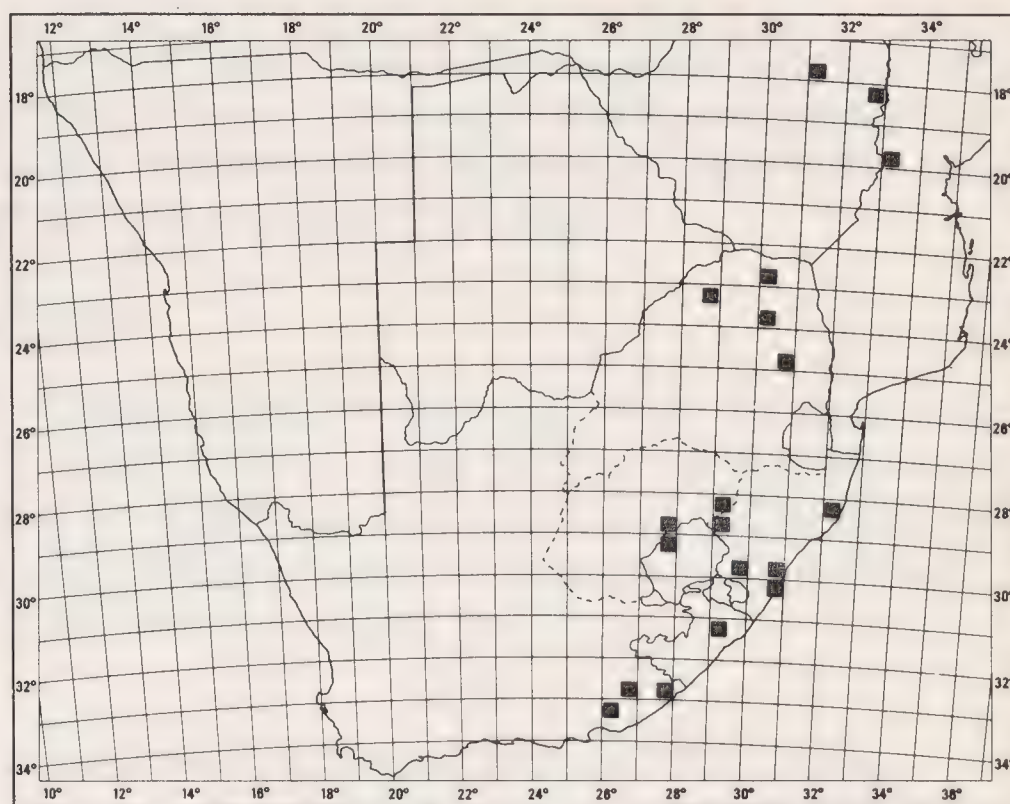
Vouchers: *Codd & Dyer* 8979 (BOL; PRE); *Moss* 17818 (J); *Roux* 377 (NBG).

7. ***Ophioglossum lancifolium* Presl**, Suppl. Tent. Pterid. 50 (1845), reimpr. in Abh. K. Böhm. Ges. Wiss., ser. 5, 4: 310 (1847); Schelpe in F.Z. Pterid.: 35, t. 8C (1970); in C.F.A. Pterid.: 36 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 163, t. 106 (1983). Type: Mauritius, *Thouars* s.n. (?PR, holo.).

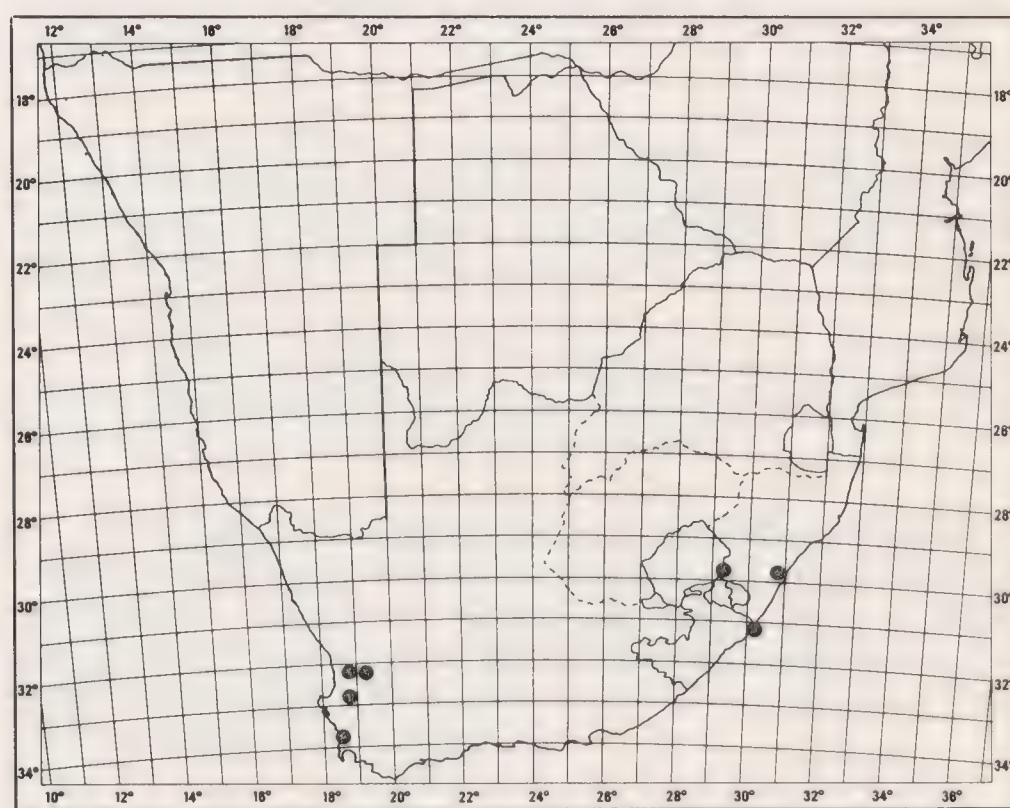
Rhizome cylindrical, 1–4 mm in diameter. *Fronds* usually 1, rarely 3; *stipe* subterranean for  $\frac{1}{3}$  to  $\frac{1}{2}$  its length, 10–100 mm long; *stipe bases* not persistent; *sterile lamina*  $20\text{--}60 \times 2\text{--}10$  mm, narrowly elliptic to almost linear, sharply acute, sometimes shortly mucronate, base attenuate to narrowly cuneate; *venation* obscure or apparent; *fertile spike* inserted at base of lamina, up to 140 mm long, with up to 30 pairs of sporangia, apiculus short or long.

South West Africa/Namibia, south-western Cape Province, Natal and Transvaal; widespread in tropical Africa. Seasonally moist soil, 500–2 000 m altitude. Map 27.

Vouchers: *Esterhuysen* 7334 (BOL); 13915 (BOL; CT; NBG; PRE); *Huntley* 2013 (PRE).



MAP 26.—*Ophioglossum vulgatum*



MAP 27.—*Ophioglossum lancifolium*







## MARATTIALES

## MARATTIACEAE

Large to very large terrestrial plants with often very large fronds and stipular outgrowths at base of stipe. *Rhizome* erect, massive, short, covered with fleshy persistent stipular outgrowths and fleshy mycorrhizal roots. *Lamina* very large, 2-pinnate; *venation* free. *Sporangia* clustered in short double rows near vein endings and fused into synangia which dehisce over vein.

## MARATTIA

**Marattia** Swartz in Prodr. Veg. Ind. Occ. 128 (1788); Engl., Pflanzenw. Afr. 2: 68 (1908); Tardieu-Blot in Fl. Madag. 1: 2 (1951); in Mém. Inst. fr. Afr. noire 28: 25 (1953); Alston in F.W.T.A. edn 2, Suppl. 19 (1959); Tardieu-Blot in Fl. Gabon 8: 32 (1964); in Fl. Camer. 3: 50 (1964); Schelpe in F.Z. Pterid.: 38 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 24 (1973); in C.F.A. Pterid.: 38 (1977). Type species: *M. alata* Swartz.

Description as for family.

A genus of over 50 species distributed through the tropics and southwards to Southern Africa and New Zealand.

**Marattia fraxinea** J.E. Sm. ex J.F. Gmel. in L., Syst. Nat. edn 13, 2, 2: 1294 (1791); Schelpe in F.Z. Pterid.: 40, t. 9 (1970); in C.F.A. Pterid.: 38 (1977). Type: ?Mauritius, Thouin s.n., Herb. Smith 1644/2 (LINN, holo.!).

Var. **salicifolia** (Schrad.) C. Chr. in Perrier, Acad. Malgache. Cat. Pl. Madag. Ptérid.: 67 (1932); Schelpe in F.Z. Pterid.: 40 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 167, t. 111 (1983). Type: Eastern Cape Province, Hesse s.n. (LE, holo.!-BOL, photo.!).

*Marattia salicifolia* Schrad. in Gött. Gel. Anz. 1818: 920 (1818); Tardieu-Blot in Fl. Madag. 1: 6, t. 1 figs 9, 10 (1951).

*Marattia natalensis* Presl, Suppl. Tent. Pterid. 9 (1845), reimpr. in Abh. K. Böhm. Ges. Wiss., ser. 5, 4: 269 (1847). Type: Natal, near Pietermaritzburg, Krauss s.n. (?PR, holo.; L-BOL, photo.!).

*Marattia dregeana* Presl, l.c., reimpr. l.c. Type: Cape Province, between the Umsikaba and Umzimvubu Rivers, Drège s.n. (?PR, holo.; L-BOL, photo.!).

*Marattia fraxinea* sensu Sim, Ferns S. Afr. edn 2: 317, t. 173 (1915).

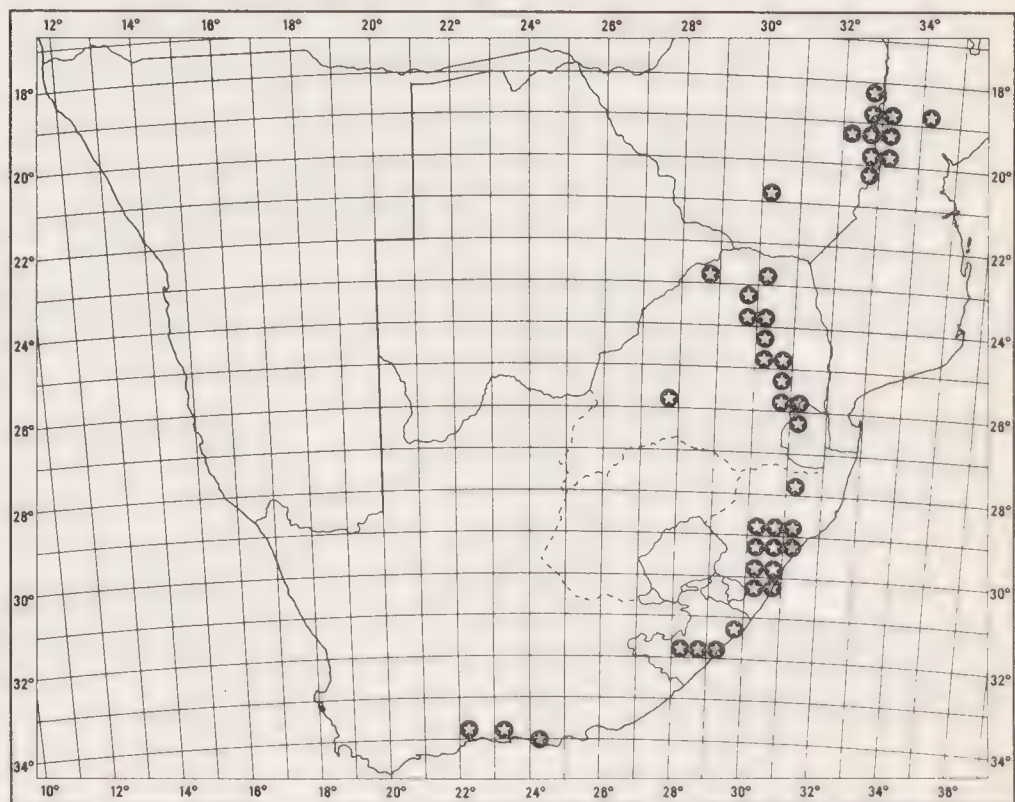
*Rhizome* up to  $0,4 \times 0,3$  m. *Fronds* arching, carnose-coriaceous; *stipe* green to purplish, up to 1,5 m long, sparsely and minutely tuberculate towards the base which is thinly clothed in narrow ferrugineous scales, with a pair of basal carnose stipules; *lamina* ovate,  $2 \times 1$  m, with a carnose swelling basally and alate pinna rhachis; *pinnules* dark green, linear to narrowly linear-attenuate, up to  $160 \times 18$  mm, base

cuneate, margin crenate to variously dentate, glabrous except for sparse minute scales along costule. *Synangia* submarginal, up to 1,5 mm long. Fig. 10.

Southern Cape Province, Transkei, Natal, Swaziland, Transvaal, Zimbabwe, Mozambique, Malawi, Zambia and East Africa. Deeply shaded and continually moist stream-banks in forest, 750–2 000 m. Map 28.

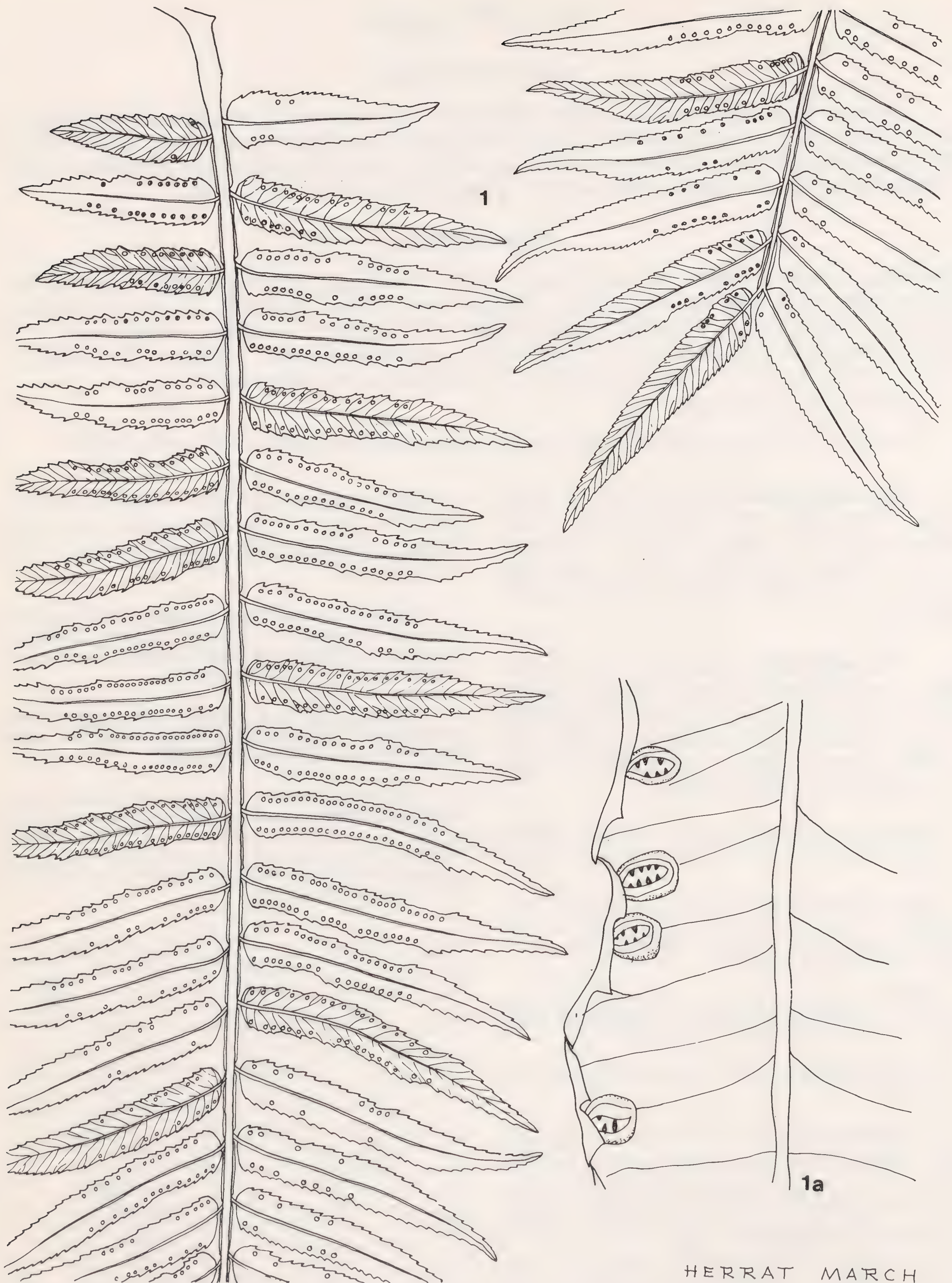
Vouchers: Enslin & Schweickerdt s.n. (NU; PRU; STE); Hutton 140 (BM; GRA; PRE); Schelpe 5972 (BM; BOL); Van Jaarsveld 6060 (BOL; NBG).

The shape of the pinnules, and especially their apices, varies considerably among the populations ascribed to this species in continental Africa and the African Islands; Southern African populations show consistently attenuated and narrower pinnules which are usually more closely serrate than in the typical form.



MAP 28.—*Marattia fraxinea* var. *salicifolia*





HERRAT MARCH

FIG. 10.—1, *Marattia fraxinea* var. *salicifolia*, part of frond,  $\times 0,6$ ; 1a, detail of portion of lower surface of pinna,  $\times 7,2$  (from live material).



## FILICALES

## ARTIFICIAL KEY TO THE GENERA

## 1a Plants aquatic, floating or rooted:

## 2a Plants aquatic, floating:

3a Leaves in whorls of three, one submerged, dissected and root-like, the other two floating ..... **Salvinia** (p. 67)3b Leaves not in whorls, 2-lobed; true roots present ..... **Azolla** (p. 67)

## 2b Plants aquatic, rooted:

4a Each frond consisting of 4 leaflets borne at apex of an obvious petiole; sporangia enclosed in hard bean-like sporocarps ..... **Marsilea** (p. 57)

4b Fronds pinnately divided; sporangia borne on pinnately divided fronds, fertile and sterile fronds dimorphic to a greater or lesser extent:

5a Fronds succulent; fertile fronds more divided than sterile fronds, sporangia borne sparsely along veins; indusium present ..... **Ceratopteris** (p. 95)5b Fronds firmly membranous; both fertile and sterile fronds simply pinnate, sori covering under surface of fertile pinnae, exindusiate ..... **Bolbitis** (p. 239)

## 1b Plants terrestrial, epiphytic or lithophytic:

## 6a Fronds (both sterile and fertile) simple or pinnatifid:

7a Sterile fronds simple, fertile fronds pinnatifid, sporangia borne on small fertile pinnae in a comb-like arrangement at apex of a very narrowly linear simple frond ..... **Schizaea** (p. 49)

## 7b Both sterile and fertile fronds similar:

## 8a Fronds simple, margin entire or subentire:

## 9a Sori acrostichoid or linear in grooves:

10a Sori acrostichoid; fronds narrowly elliptic to spatulate, erect to arching ..... **Elaphoglossum** (p. 230)10b Sori borne in two narrow grooves; fronds very narrowly linear, pendent ..... **Vittaria** (p. 89)

## 9b Sori discrete, round or linear, not in grooves:

11a Under surface of fronds densely clothed with matted stellate hairs ..... **Pyrrosia** (p. 152)

## 11b Fronds glabrous or with scattered hairs or scales:

12a Sori linear and set at an angle to midrib ..... **Loxogramme** (p. 156)

## 12b Sori round or oval:

13a Sori indusiate; lamina thickly membranous with free venation ..... **Oleandra** (p. 170)

13b Sori exindusiate; lamina thinly to thickly carnose-coriaceous, venation obscure or anastomosing:

14a Sori with conspicuous peltate paraphyses ..... **Pleopeltis** (p. 159)

## 14b Sori without peltate paraphyses:

15a Rhizome creeping, fronds spaced 10 mm or more apart; venation anastomosing:

16a Epiphytic, rhizome scandent; rhizome-scales pale brown; only costal areoles with included veinlets ..... **Microgramma** (p. 162)16b Lithophytic or terrestrial, rhizome not scandent; rhizome-scales dark brown; all areoles with included veinlets ..... **Microsorium** p.p. (p. 162)15b Rhizome short, erect, fronds tufted; venation free ..... **Grammitis** (p. 151)

## 8b Fronds shallowly to deeply pinnatifid:

17a Lamina irregularly pinnatifid, more deeply lobed towards base ..... **Pleopodium** (p. 159)

## 17b Lamina regularly and evenly pinnatifid:

18a Fronds up to 15 mm broad, lobes subdeltate ..... **Xiphopteris** (p. 152)

## 18b Fronds broader than 20 mm, lobes elongate, parallel-sided:

19a Sori partially sunk into lamina, with non-peltate paraphyses ..... **Microsorium** p.p. (p. 162)19b Sori superficial, without paraphyses ..... **Polypodium** (p. 156)

## 6b Fronds pinnate or more divided:

## 20a Fertile and sterile segments obviously dimorphous:

21a Fertile and sterile segments borne on separate fronds:



- 22a Indusium present; fertile frond pinnate; rhizome terrestrial ..... **Blechnum** p.p. (p. 267)
- 22b Indusium absent; fertile frond usually 2-pinnate; rhizome creeping to scandent ..... **Stenochlaena** (p. 277)
- 21b Sporangia borne on modified segments of a single frond:
  - 23a Frond scandent, rhachis of indefinite growth; pinnae borne in single pairs with an aborted bud between them..... **Lygodium** (p. 55)
  - 23b Frond not climbing, rhachis of indefinite growth; pinnae pinnately arranged:
    - 24a Sporangia borne on small fertile pinnae at apex of frond ..... **Osmunda** (p. 43)
    - 24b Sporangia borne on branched basal pinnae ..... **Anemia** (p. 52)
- 20b Fertile and sterile segments similar:
  - 25a Sori marginal or submarginal:
    - 26a Indusium opening outwards:
      - 27a Fronds simply pinnate; indusium linear ..... **Lindsaea** (p. 151)
      - 27b Fronds 2–5-pinnatifid; sori discrete:
        - 28a Fronds semitransparent, one cell thick, small; sori subtended by two indusial lobes:
          - 29a Indusial lobes mostly free; rhizome subglabrous ..... **Hymenophyllum** (p. 76)
          - 29b Indusium tubular to obconic; rhizome usually clothed in black or brown hairs... **Trichomanes** (p. 71)
        - 28b Fronds opaque, more than one cell thick; sori subtended by teeth, indusium single ..... **Davallia** (p. 171)
      - 26b Indusium opening inwards towards costa:
        - 30a Sori linear with obvious linear indusium:
          - 31a Fronds deeply flabellately divided ..... **Actiniopteris** (p. 148)
          - 31b Fronds pinnately divided:
            - 32a Ultimate segments articulated ..... **Pellaea** p.p. (p. 140)
            - 32b Ultimate segments not articulated:
              - 33a Venation obviously apparent and anastomosing freely to form areoles..... **Histiopteris** (p. 82)
              - 33b Venation obscure or free or forming areoles only along costa:
                - 34a Lamina thickly coriaceous; rhizome set with hairs ..... **Pteridium** (p. 83)
                - 34b Lamina herbaceous to thinly coriaceous; rhizome set with scales:
                  - 35a Ultimate fertile segments with a distinct sterile apex..... **Pteris** (p. 105)
                  - 35b Ultimate fertile segments without a distinct sterile apex..... **Cheilanthes** p.p. (p. 111)
          - 30b Sori discrete:
            - 36a Ultimate segments petiolate:
              - 37a Stipe terete; ultimate segments not ovate, but flabellate, dimidiate, cuneate ..... **Adiantum** (p. 99)
              - 37b Stipe sulcate; ultimate segments ovate, pinnately veined..... **Pellaea (pteroides)** (p. 141)
            - 36b Ultimate segments not petiolate:
              - 38a Rhizome set with hairs; lamina pubescent or pilose:
                - 39a Venation anastomosing..... **Blotiella** (p. 81)
                - 39b Venation free ..... **Hypolepis** (p. 87)
              - 38b Rhizome set with scales; lamina glabrous or set with scales or tomentose, rarely pilose:
                - 40a Sporangia conspicuous, annulus apical ..... **Mohria** (p. 53)
                - 40b Sporangia inconspicuous, annulus vertical ..... **Cheilanthes** p.p. (p. 111)
      - 25b Sori superficial on under surface of lamina:
        - 41a Sori acrostichoid or exindusiate:
          - 42a Fronds falsely dichotomously branched due to abortion of apical buds:
            - 43a Stipule-like lobes present at junction of frond branches ..... **Dicranopteris** (p. 48)
            - 43b Stipule-like lobes not present at junction of frond branches..... **Gleichenia** (p. 47)
          - 42b Fronds not dichotomously branched:
            - 44a Sori acrostichoid:
              - 45a Fronds coriaceous, fertile pinnae borne towards apex of frond ..... **Acrostichum** (p. 91)
              - 45b Fronds firmly membranous, fertile pinnae borne on separate weakly dimorphic fronds ..... **Bolbitis** (p. 239)
            - 44b Sori not acrostichoid:
              - 46a Under surface of frond densely paleaceous ..... **Ceterach** (p. 206)
              - 46b Under surface of frond glabrous, pilose or sparsely paleaceous:
                - 47a Fronds proliferous:



- 48a Sori with capitate paraphyses; lamina glabrous on both surfaces ..... **Ampelopteris** (p. 220)
- 48b Sori without paraphyses; lamina with scattered hairs on costa, costules and veins dorsally  
..... **Thelypteris** (*madagascariensis*) (p. 209)
- 47b Fronds not proliferous:
  - 49a Under surface of fronds with white, yellow or orange powder..... **Pityrogramma** (p. 97)
  - 49b Under surface of fronds without powder:
    - 50a Fronds glabrous:
      - 51a Pinnae lanceolate, deeply pinnatifid into cultrate, serrate lobes with broadened adnate bases; sporangia usually borne on basal third of pinnae ..... **Todea** (p. 45)
      - 51b Pinnae ovate deltate, pinnatifid to 2-pinnatifid into cuneate, emarginate or shallowly lobed segments; sporangia borne on all parts of ultimate segments .... **Anogramma** (p. 93)
    - 50b Fronds pubescent..... **Thelypteris** (*pozoi*) (p. 213)
- 41b Sori indusiate:
  - 52a Sori subcircular:
    - 53a Lamina pinnate to 2-pinnate:
      - 54a Lamina simply pinnate:
        - 55a Indusium reniform; venation free ..... **Nephrolepis** (p. 167)
        - 55b Indusium peltate; venation anastomosing..... **Cyrtomium** (p. 251)
      - 54b Lamina 2-pinnatifid to 2-pinnate:
        - 56a Lamina 2-pinnate; indusium peltate ..... **Didymochlaena** (p. 243)
        - 56b Lamina 2-pinnatifid; indusium reniform or cupuliform:
          - 57a Sori set on acroscopic margin of each lobe only ..... **Arthropteris** (p. 170)
          - 57b Sori borne on both acroscopic and basiscopic sides of each lobe:
            - 58a Indusium basal, opening apically, lacerate ..... **Woodsia** (p. 240)
            - 58b Indusium reniform, entire or subentire..... **Thelypteris** p.p. (p. 207)
      - 53b Lamina 3–4-pinnatifid:
        - 59a Lamina and rhachises glabrous or set with scales or both hairs and scales:
          - 60a Fronds developed basiscopically:
            - 61a Pinna costa or secondary rhachises with raised edges on upper surface:
              - 62a Basal pinnae not as long as lamina; pinnule margins crenate to serrate ..... **Dryopteris** (p. 245)
              - 62b Basal pinnae almost as long as lamina itself; pinnule margins aristate-dentate  
..... **Arachniodes** (p. 259)
            - 61b Pinna costa or secondary rhachises without raised edges on upper surface:
              - 63a Indusium peltate; lamina glabrous ..... **Rumohra** (p. 261)
              - 63b Indusium reniform; lamina pilose..... **Ctenitis** (p. 264)
          - 60b Fronds not developed basiscopically:
            - 64a Fronds glabrous ..... **Cystopteris** (p. 229)
            - 64b Fronds paleaceous:
              - 65a Indusium peltate; ultimate segments asymmetrical; margin sharply serrate; herbaceous ferns..... **Polystichum** (p. 251)
              - 65b Indusium cupuliform or asymmetric; ultimate segments symmetrical, somewhat falcate; margin subentire to dentate; arborescent ferns ..... **Cyathea** (p. 69)
        - 59b Lamina and rhachises set with hairs only:
          - 66a Hairs unicellular..... **Hypodematum** (p. 263)
          - 66b Hairs multicellular:
            - 67a Fronds proliferous..... **Tectaria** (p. 265)
            - 67b Fronds not proliferous:
              - 68a Rhizome set with hairs; rhachis and stipe of dried fronds bright yellow ..... **Microlepia** (p. 85)
              - 68b Rhizome set with scales; rhachis and stipe of dried fronds light brown:
                - 69a Multicellular hairs colourless, straight ..... **Macrothelypteris** (p. 219)
                - 69b Multicellular hairs brown, crumpled ..... **Dryothyrium** (p. 227)
    - 52b Sori linear:
      - 70a Rhizome and stipe scales clathrate..... **Asplenium** (p. 173)
      - 70b Rhizome and stipe scales not clathrate:





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- 71a Fronds simply pinnate ..... **Blechnum** p.p. (p. 267)  
 71b Fronds 2-pinnatifid or more deeply divided:  
   72a Sori elongate or J-shaped, never back to back..... **Athyrium** (p. 221)  
   72b Sori elongate, at least some back to back:  
     73a Rhizome creeping; fronds 2-pinnatifid..... **Lunathyrium** (p. 225)  
     73b Rhizome erect; fronds 3-pinnatifid ..... **Diplazium** (p. 227)

## OSMUNDACEAE

Terrestrial plants with erect or procumbent creeping rhizomes enclosed in a mass of persistent stipe bases which are winged at the base. *Fronds* deeply 2-pinnatifid to 3-pinnatifid, often clothed in woolly simple hairs during development, glabrous at maturity. *Sporangia* large, eusporangiate in development, maturing simultaneously, with a rudimentary annulus of a group of cells near the equator and borne either on both surfaces of narrow fertile pinnules or on the under surface of undifferentiated pinnae. *Gametophytes* cordate or elongate, thick, dark-green and with a discernable midrib on the under surface.

A tropical and temperate family with 3 genera, 2 occurring in Southern Africa.

- Fertile pinnules much narrower than sterile pinnules ..... 1. **Osmunda**  
 Fertile pinnules not differentiated from sterile pinnules ..... 2. **Todea**

### 1. OSMUNDA

**Osmunda** L., Sp. Pl. 1063 (1753); Gen. Pl. edn 5: 484 (1754); Engl., Pflanzenw. Afr. 2: 64 (1908); Tardieu-Blot in Fl. Madag. 9: 1 (1952); in Mém. Inst. fr. Afr. noire 28: 30 (1953); Pichi-Sermolli in Webbia 9: 644 (1954); Alston in F.W.T.A. edn 2, Suppl. 20 (1959); Tardieu-Blot in Fl. Camer. 3: 58 (1964); Schelpe in F. Z. Pterid.: 44 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 28 (1973); in C.F.A. Pterid.: 43 (1977). Lectotype species: *O. regalis* L.

Rhizome erect, without scales, covered by a mass of persistent winged leaf bases and embedded in a mass of black roots. *Lamina* 2-pinnate; *veins* free. *Sporangia* borne in dense clusters on both surfaces of narrow fertile pinnules with a much reduced laminar surface.

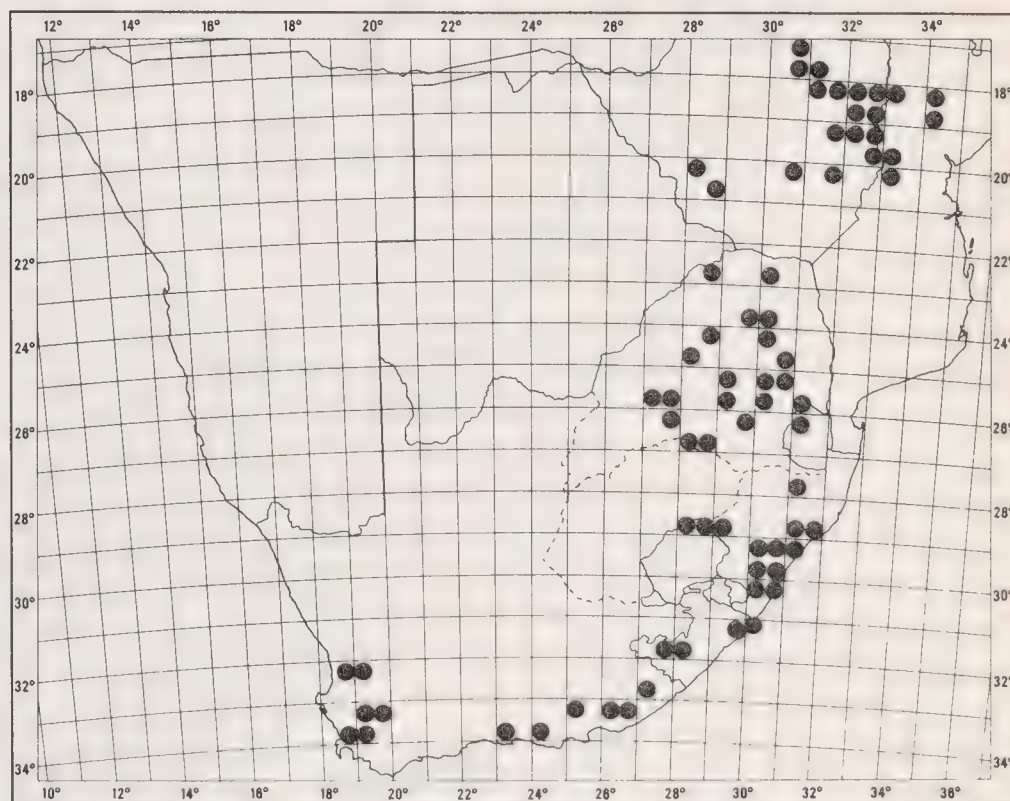
A genus of about 13 species distributed through the more temperate parts of the world. One species is represented in our area.

**Osmunda regalis** L., Sp. Pl. 2: 1065 (1753); Sim, Ferns S. Afr. edn 2: 310, t. 170 (1915); Schelpe in F. Z. Pterid.: 44, t. 10 (1970); in C.F.A. Pterid.: 43 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 169, t. 112 (1983). Type: Sweden, Småland, Rolander s.n. (LINN 1244/8, lecto.!).

*Struthiopteris regalis* (L.) Bernh. in J. Bot., Gött. 1800, 2: 126 (1801). *Aphyllocarpa regalis* (L.) Cav., in Ann. Cienc. 5: 166 (1802).

*Osmunda capensis* Presl, Suppl. Tent. Pterid. 63 (1845), reimpr. in Abh. K. Böhm. Ges. Wiss., ser. 5, 4: 323 (1847), non L. (1771). *Osmunda regalis* var. *capensis* (Presl) Milde, Fil. Europ. Atlant. 179 (1867). Type: Cape of Good Hope, Drège s.n. (?PR, holo.).

*Osmunda schelpei* Bobrov in Novosti Syst. Vyssh. Rast. 1968: 6 (1968). Type: Natal, Ngome, Gerstner 2339 (PRE).



MAP 29.—*Osmunda regalis*





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*Osmunda transvaalensis* Bobrov in Novosti Syst. Vyssh. Rast. 1968: 7 (1968). Type: Transvaal, Entabeni Forest Reserve, Codd 3039 (PRE).

Rhizome erect to suberect. *Fron*ds tufted erect, with a rufous tomentum when young, becoming glabrous at maturity; *lamina* oblong to narrowly oblong, up to 1 m long, with subopposite pinnae, fertile pinnae borne in apical portion; *sterile pinnules* herbaceous to thinly coriaceous, very narrowly to narrowly oblong, up to  $60 \times 15$  mm, unequally truncate basally, obtuse to broadly acute, minutely crenulate, petiolate except for adnate pinnules towards apices

of pinnae; *fertile pinnules* linear, up to c.  $25 \times 2$  mm, petiolate or adnate, bearing groups of sporangia at intervals. Fig. 11.

South-western Cape Province to Transkei, Lesotho, Natal, Swaziland, Transvaal, Zimbabwe, Mozambique, Malawi, Zambia, Angola, Zaire, Tanzania, Kenya, Uganda, Sudan, Cameroun, Nigeria, Liberia, Sierra Leone, Fernando Po, Madagascar and Mauritius, as well as the more temperate parts of Europa, Asia and America. Open streambanks. 700–2 000 m. Map 29.

Vouchers: Dieterlen 586 (K; PRE; SAM; STE); Enslin & Schweickerdt s.n. (NU; PRU 6256; STE 26350); Esterhuysen 13440 (BOL; NBG); Noel 1546 (BOL; GRA); Pegler 1075 (BOL; PRE).

## 2. TODEA

*Todea* Willd. ex Bernh. in J. Bot., Gött. 1800, 2: 126 (1801); Engl., Pflanzenw. Afr. 2: 64 (1908); Schelpe in F. Z. Pterid.: 46 (1970). Type species: *T. africana* Willd. ex Bernh., nom. illeg. (= *Acrostichum barbarum* L.; *T. barbara* (L.) T. Moore).

Rhizome erect to procumbent, massive and covered by persistent winged stipe bases and thick brown roots. *Lamina* deeply 2-pinnatifid; *veins* free. *Sporangia* borne on under surface of the distal parts of the lower pinnae of undifferentiated fronds.

A monotypic genus extending from South Africa to Australia and New Zealand.

*Todea barbara* (L.) T. Moore, Ind. Fil. 119 (1857); Sim, Ferns S. Afr. edn 2: 309, t. 169 (1915); Schelpe in F.Z. Pterid.: 46, t. 11 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 170, t. 113 (1983). Type: South-western Cape Province, Adair s.n., Herb. Sloane (BM, holo.).

*Acrostichum barbarum* L., Sp. Pl. 2: 1072 (1753). *Osmunda barbara* (L.) Thunb., Prodr. 171 (1800).

*Osmunda totta* Swartz in J. Bot., Gött. 1800, 2: 105 (1801), nom. illeg.

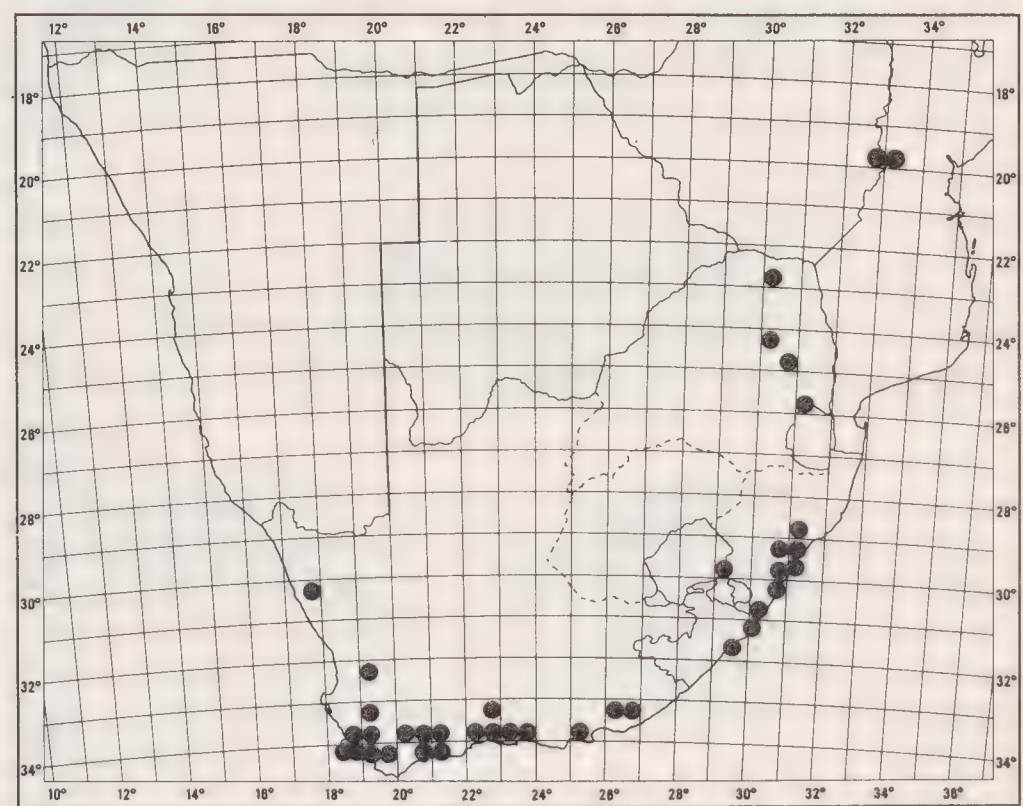
*Todea africana* Willd. in Nov. Act. Acad. Erfurt. 2: 14, t. 3 fig. 1 (1802), nom. illeg.

Rhizome up to 0,12 m in diameter, bearing tufted fronds at apex. *Fron*ds erect, set with a loose rufous tomentum during development but glabrous at maturity; *stipe* pale brown, smooth, up to 15 mm in diameter near base; *lamina* narrowly oblong, up to  $1,1 \times 0,44$  m; *pinnae* cultrate to narrowly lanceolate, usually set at an angle of  $40\text{--}50^\circ$  to rhachis, pinnatifid almost to costa into cultrate, minutely serrate, acute, coriaceous lobes up to  $40 \times 5$  mm with broadened adnate bases. *Sporangia* usually on distal third of pinnae. Fig. 12.

Cape Province, Transkei, Natal, Swaziland, Transvaal, Zimbabwe and southern Mozambique. Moist streambanks at higher altitudes, especially conspicuous in moist ravines and wet south aspect slopes on the mountains of south-western Cape Province. Map 30.

Vouchers: Cooper 1738 (BM; K; NH; PRE); Parker 4251 (BOL; NBG); Schweickerdt 2442 (BOL; PRU); Sim s.n. (BOL; GRA; PRE); Smith 116 (STE).

The Australasian segregate of the species—*T. barbara* subsp. *rivularis* (Sieber ex Kunze) C. Chr.—generally exhibits relatively narrower pinnules.



MAP 30.—*Todea barbara*







## GLEICHENIACEAE

Terrestrial herbs with widely creeping rhizomes, set with scales or hairs, becoming subglabrous with age. *Fronds* variously compound (in African species) as a result of growth or abortion of a terminal bud between a pair of lateral branches or pinnae (false dichotomy); *venation* free. *Sporangia* grouped in small sori without indusia; *annulus* complete, oblique; dehiscence by a vertical slit. *Gametophyte* green, cordate, becoming elongate with a thicker central rib.

Genera 5, with about 160 tropical, subtropical and south-temperate species. Two genera occur in Southern Africa.

Rhizome set with lanceolate or deeply laciniate scales resembling stellate hairs in appearance; fronds without a pair of distinct stipule-like pinnae flanking primary bifurcation of frond..... 1. **Gleichenia**

Rhizome set with multicellular hairs but without scales; fronds with a pair of stipule-like pinnae flanking primary and often secondary bifurcations of frond ..... 2. **Dicranopteris**

## 1. GLEICHENIA

**Gleichenia** J.E. Sm. in *Memorie Accad. Sci. Torino* 5: 419 (1793); Engl., *Pflanzenw. Afr.* 2: 61 (1908); Tardieu-Blot in *Fl. Madag.* 7: 1 (1952); in *Mém. Inst. fr. Afr. noire* 28: 34 (1953); Alston in *F.W.T.A. edn 2, Suppl.* 20 (1959); Tardieu-Blot in *Fl. Gabon* 8: 48 (1964); in *Fl. Camer.* 3: 60 (1964); Schelpe in *F.Z. Pterid.*: 48 (1970); in *C.F.A. Pterid.*: 44 (1977), nom. conserv. Type species: *G. polypodioides* (L.) J.E. Sm. (= *Onodea polypodioides* L.).

Rhizome set with subentire to deeply laciniate scales. *Fronds* repeatedly falsely dichotomous, but with occasional development of axial apical bud resulting in elongation of frond. *Terminal buds* set with scales somewhat similar to rhizome-scales. *Lateral axes* of fronds, between false dichotomies, bearing foliar segments. (Any extension of primary axial, not lateral, axis of frond devoid of foliar segments). *Sporangia* in groups of 2–4 (usually 4) on veins.

A genus of about 10 species found in Southern Africa, Malaysia, Australia, New Zealand and the Mascarene Islands.

Branches of the ultimate false dichotomy bipinnate; foliar segments (pinnules) divided to midrib into rounded deltate lobes; sori sunken into lamina ..... 1. *G. polypodioides*

Branches of the ultimate false dichotomy pinnate; pinnules linear, entire; sori superficial ..... 2. *G. umbraculifera*

1. **Gleichenia polypodioides** (L.) J.E. Sm. in *Memorie Accad. Sci. Torino* 5: 419, t. 9 fig. 10 (1793); Sim, *Ferns S. Afr.* edn 2: 296, t. 156 (1915); Schelpe in *F.Z. Pterid.*: 48 (1970); in *C.F.A. Pterid.*: 44 (1977); W. B. G. Jacobsen, *Ferns Sthn Afr.* 182, t. 123 (1983). Type: Cape Peninsula, Table Mountain, Koenig 44 (? Lost).

*Onoclea polypodioides* L., *Mant. Alt.* 306 (1771). *Calyptella polypodioides* (L.) Ching in *Sunyatsenia* 5: 288 (1950).

*Gleichenia argentea* Kaulf., *Enum. Fil.* 36 (1824). Type: Cape Peninsula, Chamisso s.n. (?LE, holo.).

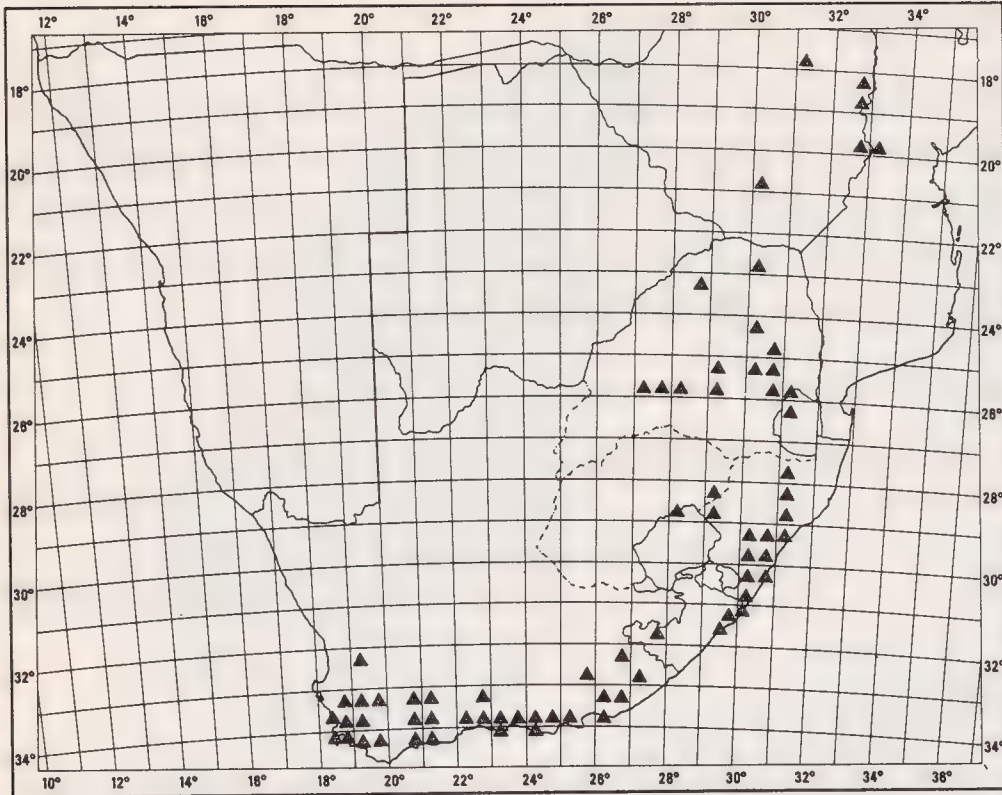
Rhizome 1–2,5 mm in diameter, set with long-spined dark brown scales up to 0,5 mm in diameter. *Fronds* spaced 20–200 mm apart, bifurcate to reniform-lunate in outline, with 1 (rarely 2) level of false dichotomy in each lateral

branch system arising from each side of terminal bud; all branches bearing distant foliar segments; *stipe* castaneous, glabrous or with a few scales similar to those on rhizome, shallowly sulcate, up to 600 × 1,5 mm; *aborted apical buds* up to 1,2 mm long, set with dark brown lanceolate laciniate scales (sometimes with black spines); *pinnules* linear, usually glabrous, up to 70 × 7,5 mm, divided into lobes, under surface green to glaucous, 3 × 2 mm. *Sori* partially immersed in lamina, consisting of 2–4 sporangia, each in a separate but adjoining pit. Fig. 13: 1.

Cape Province, Transkei, Natal, Lesotho, north-eastern Orange Free State, Swaziland, Transvaal, Zimbabwe, Mozambique, Angola, Tanzania and on Madagascar, Mauritius and Amsterdam Island. In sheltered, often shaded, rock crevices and slopes, 1 220–1 870 m. It has become a weed in the moister pine plantations of southern Cape Province. Map 31.

FIG. 13.—1, **Gleichenia polypodioides**, part of frond, × 0,6; 1a, detail of lower surface of ultimate segments, × 4,8 (Hemm 419). 2, **Gleichenia umbraculifera**, part of frond, × 0,6; 2a, detail of lower surface of portion of ultimate segment, × 4,8 (Schelpe 4543). 3, **Dicranopteris linearis**, part of frond, × 0,6; 3a, detail of lower surface of portion of ultimate segment, × 4,8; 3b, sporangium, × c. 42 (Mitchell 402).



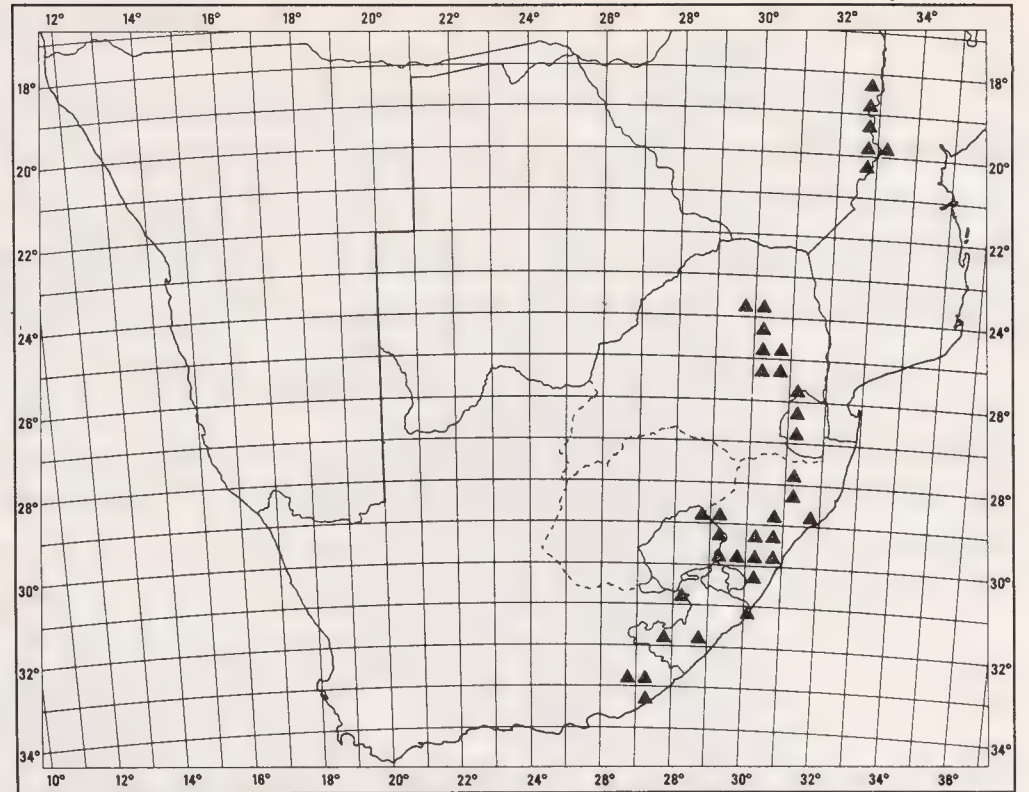
MAP 31.—*Gleichenia polypodioides*

Vouchers: *Heginbotham* 329 (NBG; STE); *Hutton* 136 (BM; GRA; PRE); *Schelpe* 6149 (BM; BOL); *Venter* 8495 (BLFU; BOL); *Whellan* 1491 (BM; BOL; SRGH).

2. *Gleichenia umbraculifera* (Kunze) T. Moore, Ind. Fil. 384 (1862); Sim, Ferns S. Afr. edn 2: 298, t. 157 (1915); Schelpe in F.Z. Pterid.: 50 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 183, t. 124 (1983). Type: Natal, Omnaroti River (?Umvoti River), *Gueinzis* s.n. (LZ, holotype).

*Mertensia umbraculifera* Kunze in Linnaea 18: 114 (1844). *Sticherus umbraculiferus* (Kunze) Ching in Sunyatsenia 5: 285 (1940).

Rhizome up to 8 mm in diameter, set with appressed lanceolate subentire or ciliate light brown rhizome-scales. Fronds spaced 20–100 mm apart, usually reniform in outline with up to 5 successive levels of false dichotomies in each

MAP 32.—*Gleichenia umbraculifera*

lateral branch system arising from each side of a terminal axial bud; all branches bearing closely spaced foliar segments; *stipe* erect, stramineous, darker basally, weakly sulcate, usually naked; *aborted apical buds* and young branch axes set with light brown variously lacinate lanceolate scales up to 1.5 mm long; *pinnules* up to 35 × 3 mm, with broadened sessile bases, apices rounded to narrowly acute, upper surface green, under surface usually glaucous, eventually glabrous. *Sori* consisting of groups of 3–4 sporangia. Fig. 13: 2.

Eastern Cape Province, Transkei, Natal, Swaziland, Transvaal and Zimbabwe, possibly extending northwards to Tanzania. Around boulder bases in grassland and on streambanks in partial shade, 1 220–1 830 m. Map 32.

Vouchers: *Fisher* 776 (BLFU; NH; NU); 836; 875 (NH; NU; PRE); *Hutton* 138 (BM; GRA; PRE); *Schlechter* 6757 (BM; GRA; PRE); *Schütte* 10 (BM; BOL).

## 2. DICRANOPTERIS

*Dicranopteris* Bernh. in Neues J. Bot. 1, 2: 38 (1805); Tardieu-Blot in Fl. Madag. 7: 4 (1952); Pichi-Sermolli in Webbia 17: 37 (1962); Schelpe in F.Z. Pterid.: 50 (1970); in Expl. Hydrobiol. Bassin. L. Bangw. & Luapula 8,3 Pterid. 30 (1973); in C.F.A. Pterid.: 46 (1977). Type species: *D. dichotoma* (Thunb. ex Murray) Bernh. (= *Polypodium dichotomum* Thunb. ex Murray).

Rhizome set with sparse multicellular hairs, becoming glabrous with age. Fronds repeatedly falsely dichotomous, but with occasional development of axial apical bud resulting in elongation of frond. Terminal buds densely set with multicellular hairs. Primary, and often secondary, false dichotomies flanked by stipule-like pinnae. Foliar segments only on stipule-like pinnae and on branches of ultimate false dichotomies. Sporangia single or in groups of 2–15 on veins.

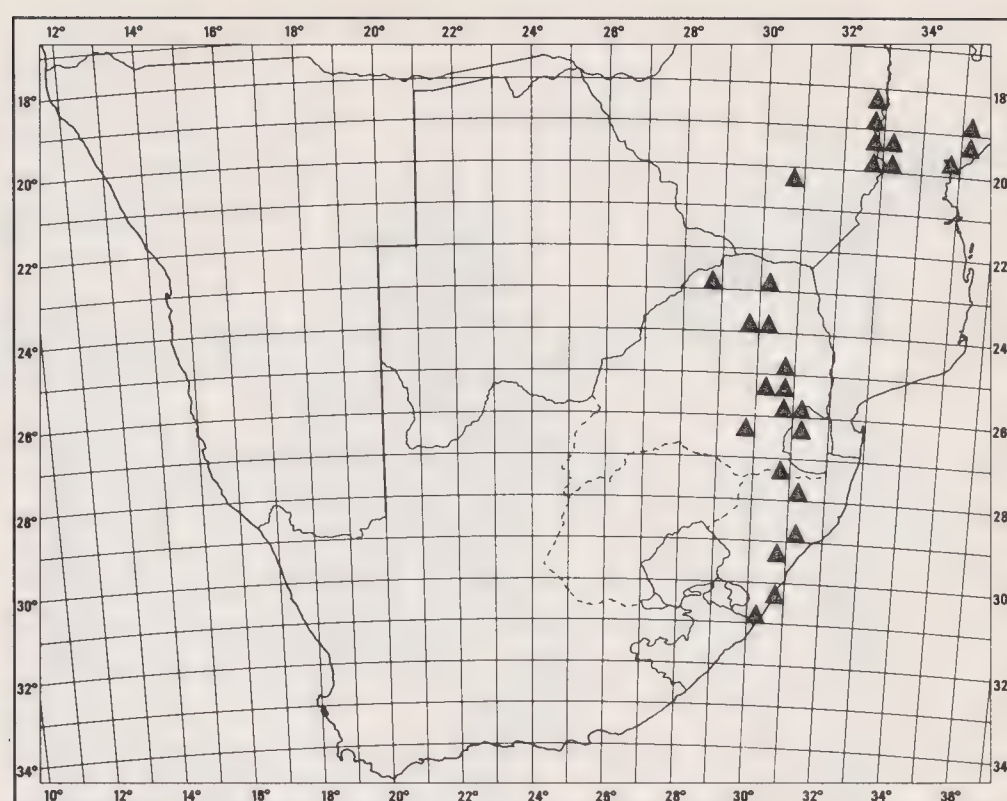
A genus of 10 pantropical species.



***Dicranopteris linearis* (Burm. f.) Underw.** in Bull. Torrey bot. Club 34: 250 (1907); Schelpe in F.Z. Pterid.: 50 (1970); in C.F.A. Pterid.: 46, t. 5 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 184, t. 125 (1983). Type: Java, Santen s.n., Herb. Delessert (G, holo.).

*Polypodium lineare* Burm. f., Fl. Ind. 235, t. 67 fig. 2 (1768). *Gleichenia linearis* (Burm. f.) Clarke in Trans. Linn. Soc. Lond. 1: 428 (1880); Sim, Ferns S. Afr. edn 2: 299, t. 158 (1915). *Mertensia linearis* (Burm. f.) Fritsch in Bull. Herb. Boissier, sér. 2, 1: 1092 (1901).

Rhizome 1–5 mm in diameter, when young set with hairs up to 2 mm long. *Fronds* spaced 60–200 mm apart, bifurcate to reniform-lunate in outline with 1–3 levels of false dichotomy in each lateral branch system arising from each side of terminal bud; only stipule-like, deeply pinnatifid pinnae (up to 120 × 40 mm), and ultimate branches of false dichotomies bearing foliar segments; *stipe* stramineous to light reddish brown, glabrous, up to 700 × 4 mm; *aborted apical buds* set with reddish brown hairs; *pinnules* linear, sessile, up to 30 × 5 mm, confluent at their broadened bases, apices emarginate, glabrous. *Sori* superficial, consisting of a single sporangium or groups of 2–10. Fig. 13: 3.



MAP 33.—*Dicranopteris linearis*

Widespread on the continent and islands of Africa. In Southern Africa it is restricted to the eastern portion, being found in Natal, Swaziland, Transvaal, Zimbabwe and Mozambique. Pantropical. Exposed moist banks, 820–1 050 m. Map 33.

Vouchers: *Acocks* 11759 (BOL; NH; PRE); *Scheepers* 1009 (PRE); *Schelpe* 1674 (BOL; K; NH; NU); *Van Jaarsveld* 154 (NBG); *Whellan* 1094 (BOL; SRGH).

## SCHIZAEACEAE

Terrestrial ferns with creeping rhizomes set with hairs or scales. *Fronds* pinnate to 3-pinnatifid, erect, or dichotomously branched and pinnately divided and climbing. *Veins* free or anastomosing. *Fertile* regions differing in appearance to a greater or lesser extent from sterile regions. *Sori* marginal in origin subsequently becoming superficial. *Sporangia* with apical annuli and dehiscing vertically.

This family comprises four genera with about 160 species that are almost entirely confined to tropical regions.

- 1a Fronds climbing; rhachis of indefinite growth; pinnae borne in single pairs with an aborted bud between them ..... 4. *Lygodium*
- 1b Fronds not climbing; rhachis of definite growth; pinnae pinnately arranged:
  - 2a Sporangia borne on small fertile pinnae at the apex of a very narrowly linear frond ..... 1. *Schizaea*
  - 2b Sporangia borne on branched basal pinnae or on unmodified pinnae:
    - 3a Sporangia borne on much modified branched basal pinnae; rhizome set with hairs ..... 2. *Anemia*
    - 3b Sporangia borne on unmodified pinnae; rhizome set with scales ..... 3. *Mohria*

### 1. SCHIZAEA

***Schizaea* J.E. Sm.** in Memorie Accad. Sci. Torino 5: 419, t. 9 f. 9 (1793); Engl., Pflanzenw. Afr. 2: 62 (1908); Tardieu-Blot in Fl. Madag. 8: 1 (1952); Schelpe in F.Z. Pterid.: 52 (1970), nom. conserv. Type species: *S. dichotoma* (L.) J.E. Sm. (= *Acrostichum dichotomum* L.).

Rhizome short, horizontal, subterranean, with closely spaced fronds and set with multicellular hairs. *Fertile fronds* very narrowly linear (in southern African species) or dichotomously branched with a crowded group of pinnately arranged fertile pinnae at apex or apices. *Sporangia* in two rows, one on either side of each fertile pinna.







A genus of about 30 species confined almost entirely to the tropics and the Southern Hemisphere. Two species occur in our area.

- Rhachis between fertile pinnae recurved through a semicircle at maturity with longest fertile pinnae about the middle and with shorter pinnae at base and apex .....1. *S. pectinata*  
Rhachis between fertile pinnae ascending, with fertile pinnae progressively shorter towards apex .....2. *S. tenella*

1. **Schizaea pectinata** (L.) Swartz in J. Bot., Gött, 1800, 2: 102 (1801); Sim, Ferns S. Afr. edn 2: 301, t. 159 fig. 1 (1915); Schelpe in F.Z. Pterid.: 52, t. 14 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 173, t. 115 (1983). Type: Aethiopia (LINN 1245/2, holo.!).

*Acrostichum pectinatum* L., Sp. Pl. 2: 1068 (1753).

Rhizome horizontal, subterranean, up to 4 mm in diameter, set with multicellular hairs up to 5 mm long. *Fronds* very closely spaced, very narrowly linear, up to 200 × 1,5 mm, sulcate and narrowly winged; *stipe* brown, filiform, up to 70 mm long; *fertile portion* up to 16 mm long, with a recurved rhachis; *fertile pinnae* up to 9 × 1 mm, longer towards middle, shorter towards base and apex of fertile portion, ciliate with pale hairs. *Sporangia* in a row on either side of costa. Fig. 14: 1.

South-western Cape Province to Transkei, Natal, Swaziland, Transvaal, Zimbabwe, Mozambique, Malawi, Madagascar and Tanzania. Common on dry mountain slopes and flats in south-western Cape Province, decreasing in frequency eastwards into open sclerophyll scrubland, up to 2 700 m altitude. Fertile fronds are normally only found after fire. Map 34.

Vouchers: *Burchell* 4612 (BM; BOL; K; SAM); *Esterhuysen* 10210 (BOL; NBG; NU; PRE); *Hutchinson* 98

(BOL; K; PRE); *Muir* 474 (NH; PRE; SAM); *Schelpe* 4905 (B; BOL; GH; K; M; MO; P; PRE; S; US).

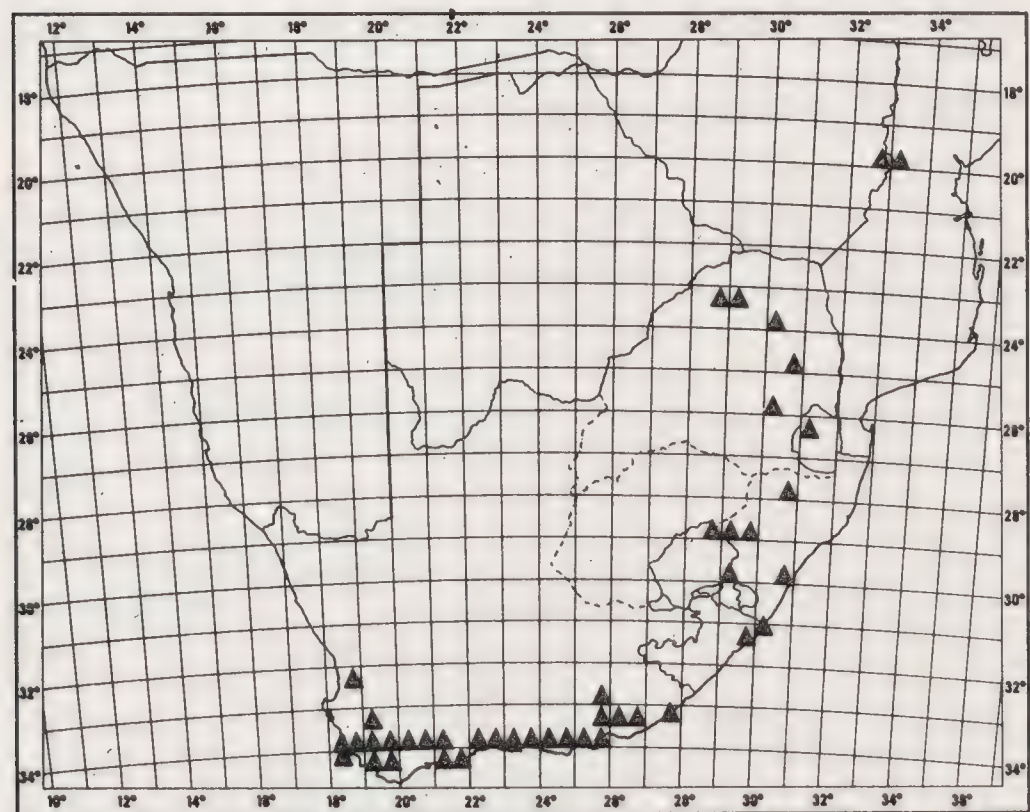
2. **Schizaea tenella** Kaulf., Enum. Fil. 50, t. 1 fig. 7 (1824); Sim, Ferns S. Afr. edn 2: 300, t. 160 fig. 1 (1915); W. B. G. Jacobsen, Ferns Sthn Afr. 172, t. 116 (1983). Type: Cape of Good Hope, *Chamisso* s.n. (?LE, holo.; E!).

*Microschizaea tenella* (Kaulf.) Reed in Bolm. Soc. boteriana, sér. 2, 21: 134 (1938).

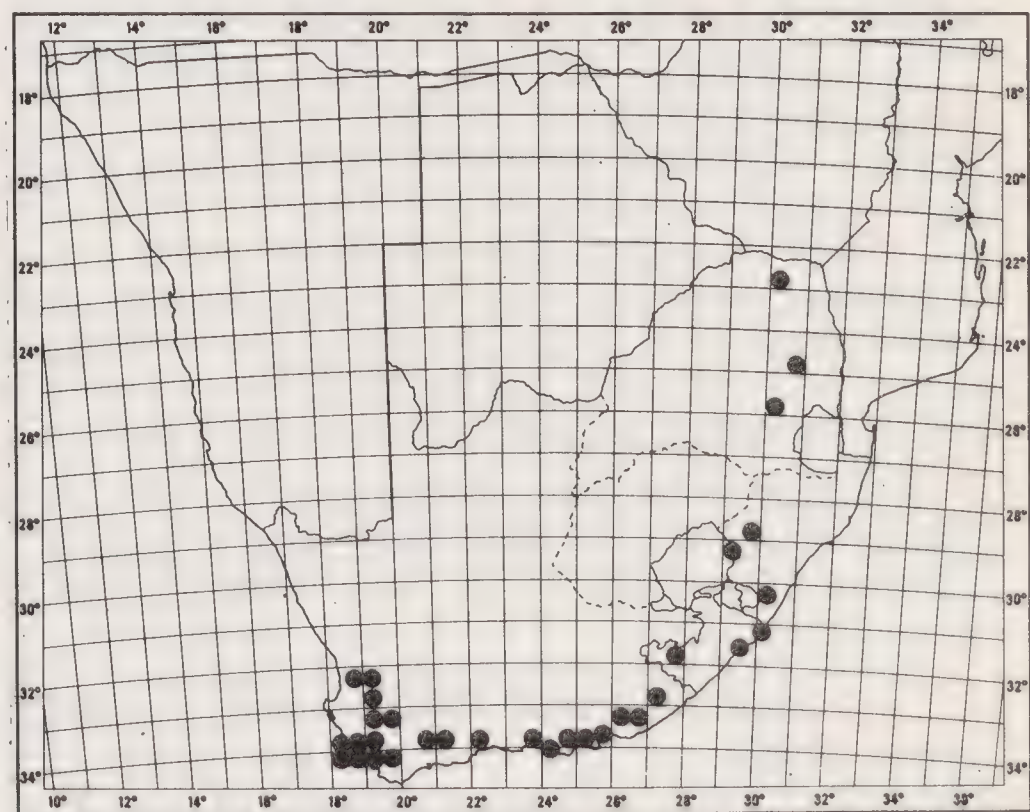
Rhizome up to 40 × 4 mm, densely set with shining brown multicellular hairs. *Fronds* filiform, glabrous, up to 230 × c. 0,5 mm, sulcate, with a poorly delimited dark brown stipe 3–10 mm long; apical *fertile portion* up to 13 mm long with rhachis between fertile pinnae ascending at c. 45°; *fertile pinnae* up to 4 × 0,5 mm, becoming progressively shorter towards frond apex, fringed with pale hairs. Fig. 14: 2.

South-western Cape Province to Transkei, Natal and Transvaal; in continually moist habitats such as mossy streambanks, crevices and ledges about waterfalls, and dripping rock faces, between 330 and 2 160 m altitude. Map 35.

Vouchers: *De Vos* 1320 (STE); *Esterhuysen* 1294 (BOL; NBG); 6758 (BOL; K; PRE); *Strey* 6922 (NH; NU); *Wager* s.n. (PRE).



MAP 34.—*Schizaea pectinata*



MAP 35.—*Schizaea tenella*

FIG. 14.—1, *Schizaea pectinata*, plant, × 0,6; 1a, fertile pinna, × 8,4 (*Esterhuysen* 24464). 2, *Schizaea tenella*, plant, × 0,6 (*Esterhuysen* 25433). 3, *Anemia dregeana*, part of plant, × 0,6; 3a, detail of fertile part of frond, × 3; 3b, sporangium, × c. 42 (*Schlechter* 6786). 4, *Anemia simii*, frond, × 0,6 (*Chase* 1008).



## 2. ANEMIA

**Anemia** Swartz, Syn. Fil. 6, 155 (1806); Engl., Pflanzenw. Afr. 2: 64 (1908), as *Aneimia*; Tardieu-Blot in Fl. Madag. 8: 6 (1952); in Mém. Inst. fr. Afr. noire 28: 33 (1953); Pichi-Sermolli in Webbia 9: 649 (1954); Alston in F.W.T.A. edn 2, Suppl. 22 (1959); Schelpe in F.Z. Pterid.: 52 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 32 (1973); in C.F.A. Pterid.: 47 (1977), nom. conserv. Type species: *A. phyllitidis* (L.) Swartz. (= *Osmunda phyllitidis* L.).

Rhizome short, erect or creeping, set with hairs. *Fronds* pinnate to 2-pinnate, basal pair of pinnae usually fertile. *Fertile pinnae* with long petioles, dissected much-contracted segments bearing sporangia in two rows on each segment.

Genus chiefly American, containing about 90 tropical and subtropical species.

Fronds (excluding fertile pinnae) pinnate ..... 1. *A. dregeana*  
Fronds 2-pinnate ..... 2. *A. simii*

1. **Anemia dregeana** Kunze in Linnaea 10: 493 (1836); Sim, Ferns S. Afr. edn 2: 307, t. 166 fig. 1 (1915); W. B. G. Jacobsen, Ferns Sthn Afr. 174, t. 116 (1983). Type: Transkei, Umzimvubu River, *Drège* α (LZ, syn. †; BM, lecto. !; P-BOL, photo.!).

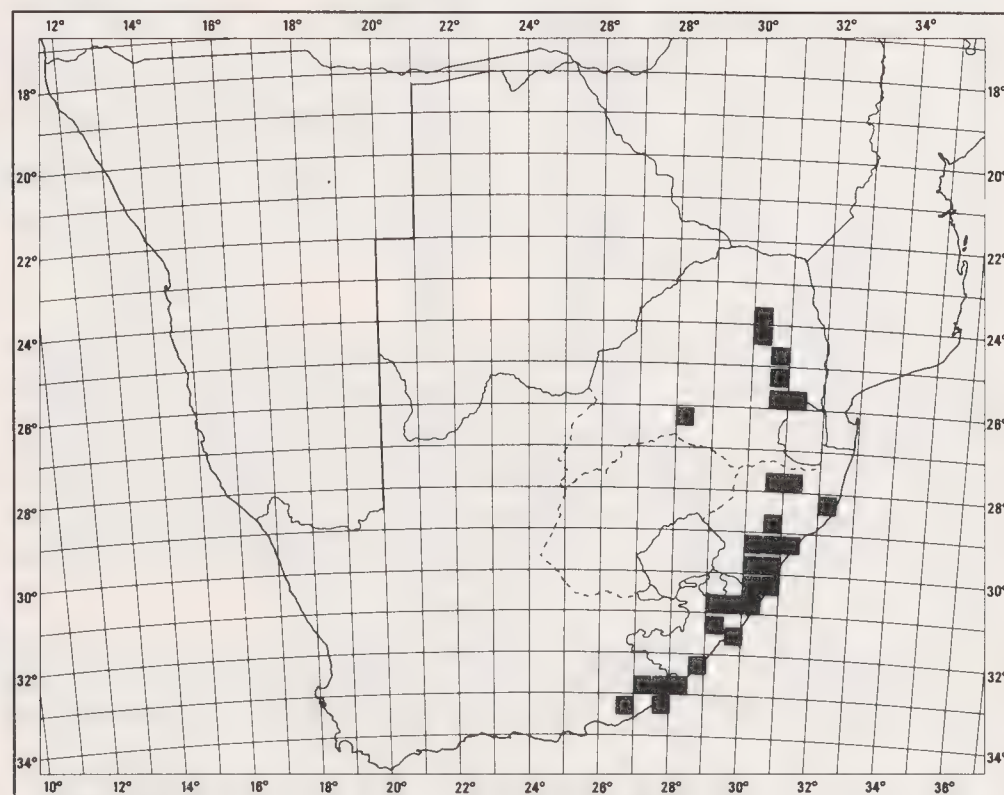
Rhizome erect to suberect, up to 8 mm in diameter. *Stipe* up to 210 mm long, set with villous brown multicellular hairs up to 5 mm long. Sterile portion of *frond* linear-acute to lanceolate-acute, pinnate, up to 250 × 100 mm; *rhachis* villous; *sterile pinnae* sessile, the smaller ovate-oblong, rounded, with auriculate to truncate base, the larger lanceolate, bluntly acute with unequally cuneate base, up to 55 × 23 mm, margin finely crenulate, costa often villous below; *veins* free. *Fertile pinnae* erect, shorter than, equal to, or longer than, sterile portion, with petiolules up to 100 mm long and fertile pinna proper up to 180 mm long, 3-pinnatifid, segments glabrous, c. 0.2 mm wide, bearing naked sporangia. Fig. 14: 3.

Eastern Cape Province, Transkei, Natal, Swaziland and Transvaal. Occasional to locally common in forest habitats, usually in shade, and frequently on rocky stream-banks, between 300 and 1 100 m altitude. Map 36.

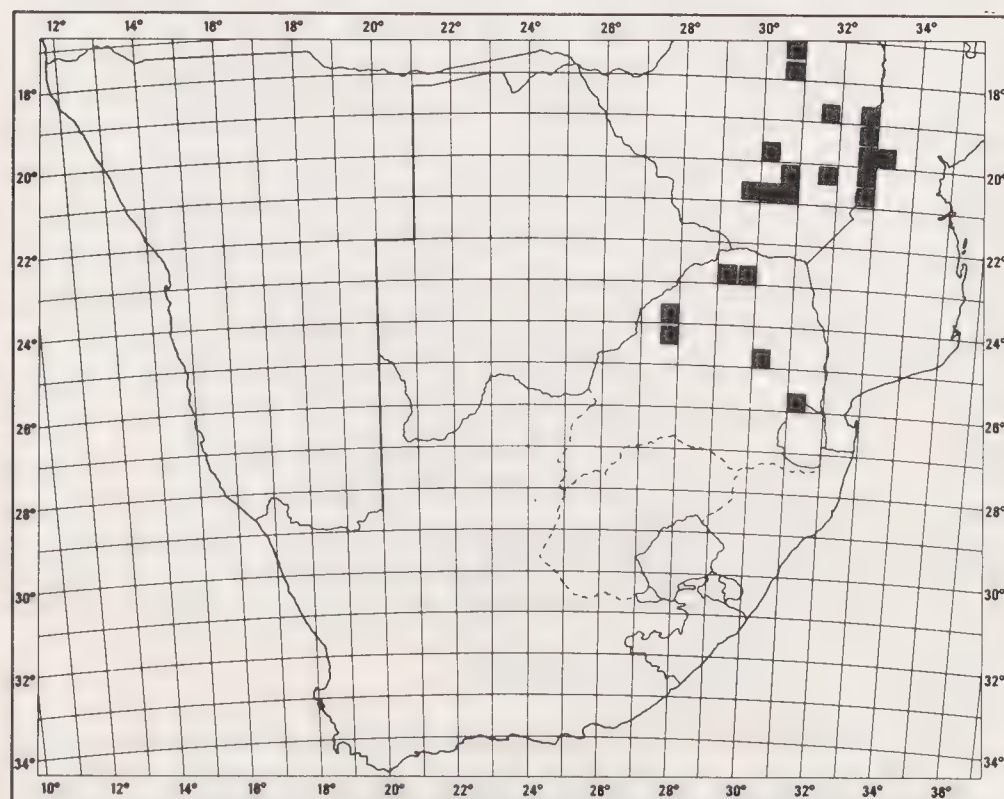
Vouchers: *Enslin & Schweickerdt* s.n. (NU; PRU; STE); *Pegler* 22 (BM; K; PRE); *Roux* 539 (NBG); *Schlechter* 6786 (BOL; GRA; PRE); *Ward* 2350 (NPB; NU).

2. **Anemia simii** Tardieu-Blot in Notul. Syst., Paris 14: 208 (1952), pro parte excl. specim. Angol. emend. Alston in Contr. Conhec. Fl. Mocamb. 2: 8, t. 36 (1954); Schelpe in F.Z. Pterid.: 54, t. 15 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 175, t. 117 (1983). Type: Transvaal, Barberton, *Thorncroft* 959 (P, holo.—BOL, photo. !; PRE!).

*Anemia anthriscifolia* sensu Sim, Ferns S. Afr. edn 2: 308, t. 164 (1915).



MAP 36.—*Anemia dregeana*



MAP 37.—*Anemia simii*



Rhizome horizontal, up to  $5 \times 8$  mm, densely set with light brown to reddish brown multicellular hairs up to 7 mm long. *Fronde* tufted, firmly herbaceous; *stipe* stramineous, up to 230 mm long, thinly villous with brown multicellular hairs up to 4 mm long; *sterile lamina* ovate-deltate to deltate, up to  $130 \times 120$  mm, 2-pinnate to 3-pinnatifid; *sterile pinnae* pinnate to 2-pinnatifid, shortly petiolulate, sparsely villous on both surfaces; *ultimate segments* obtuse to rounded, decurrent, sinuately lobed, minute-

ly crenate-dentate. *Fertile pinnae* erect, longer than sterile portion, with petiolules up to 80 mm long and fertile pinnae proper up to 140 mm long, 3-pinnatifid, segments glabrous, up to 1 mm broad; *rhachis* thinly villous. Fig. 14: 4.

Transvaal, Zimbabwe and Mozambique. Usually under the shade of tall woodland, often on streambanks, between 800 and 1 500 m. Map 37.

Vouchers: *Bredenkamp* 1586 (PRU); *Thorncroft* 796 (K; NH; PRE).

### 3. MOHRIA

**Mohria** Swartz, Syn. Fil. 6, 159 (1806); Engl., Pflanzenw. Afr. 2: 64 (1908); Tardieu-Blot in Fl. Madag. 8: 9 (1952); Schelpe in F.Z. Pterid.: 54 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 33 (1973); in C.F.A. Pterid.: 48 (1977). Type species: *M. thurifraga* Swartz, nom. illeg. (= *Polypodium caffrorum* L.; *M. caffrorum* (L.) Desv.).

Rhizome short, horizontal, set with brown scales. *Fronde* 2- to 3-pinnatifid, not or slightly dimorphic. *Sori* of few sessile submarginal sporangia partly covered by reflexed margins of ultimate segments.

A genus of 3 species confined to Southern and south-east tropical Africa, Madagascar and Mascarene Islands. Two species occur in Southern Africa.

Rhachis and lamina set with pale brown to castaneous scales.....1. *M. caffrorum*  
Rhachis and lamina set with pale to white uniseriate hairs ..... 2. *M. hirsuta*

1. **Mohria caffrorum** (L.) Desv. in Mém. Soc. Linn., Paris 6, 2: 198 (1827); Sim, Ferns S. Afr. edn 2: 304, t. 160 fig. 2 (1915); Schelpe in F.Z. Pterid.: 56, t. 15B (1970); in C.F.A. Pterid.: 48 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 177, t. 119 (1983). Type: Cape of Good Hope, *Koenig* s.n. (LINN 1251/67, holo.).

*Polypodium caffrorum* L., Mant. Alt. 307 (1771). *Adiantum caffrorum* (L.) L. f., Suppl. 447 (1781). *Lonchitis caffrorum* (L.) Bernh. in J. Bot., Gött. 1800, 2: 124 (1801). *Colina caffrorum* (L.) Greene in Erythea 1: 247 (1893).

*Osmunda thurifera* Swartz in J. Bot., Gött. 1800, 2: 105 (1801). Type: Cape of Good Hope, *Thunberg* s.n. (UPS, lecto.).

*Osmunda thurifraga* Bory, Voy. 1: 348 (1804). *Mohria thurifraga* (Bory) Swartz, Syn. Fil. 159, 385, t. 5 (1806). Type: Probably Réunion, *Bory* (P).

*Cheilanthes fuscata* Blume, Enum. Pl. Jav. 116 (1828). Type: Cape Province (L, holo.).

*Mohria thurifraga* var. *achilleifolia* T. Moore in Lowe, New Ferns t. 42B (1862). Type unknown.

Rhizome creeping, up to 10 mm in diameter, set with pale brown, lanceolate to linear, acuminate rhizome-scales up to 7 mm long. *Fronde* tufted, erect, firmly herbaceous to

thinly coriaceous; *stipe* pale brown in upper part, castaneous towards base, from almost as long as lamina to 1/10 its length, set with pale brown, lanceolate to subulate scales at least when young; *lamina* narrowly oblong to narrowly elliptic, up to  $570 \times 110$  mm, long or shortly tapering below; *pinnae* pinnatifid to 2-pinnatifid into crenate or serrate lobes, under surface set with lanceolate-acuminate to hair-like subulate pale brown scales up to 2 mm long, upper surface subglabrous or thinly pilose, *rhachis* pale brown, set with scales similar to those on *stipe*. Fig. 15: 3.

Cape Province, Transkei, Natal, Lesotho, Orange Free State, Swaziland, Transvaal, Zimbabwe, Mozambique, Tanzania, Réunion and Madagascar. Forest margins and around boulder bases in grassland, 1 500–2 300 m. Map 38.

Vouchers: *Boucher* 3931 (STE); *Cooper* 1447 (BM; K; NH); *Geldenhuys* 555 (BOL); *Schlechter* 6666 (GRA; K; PRE); *Ward* 3396 (NPB; NU).

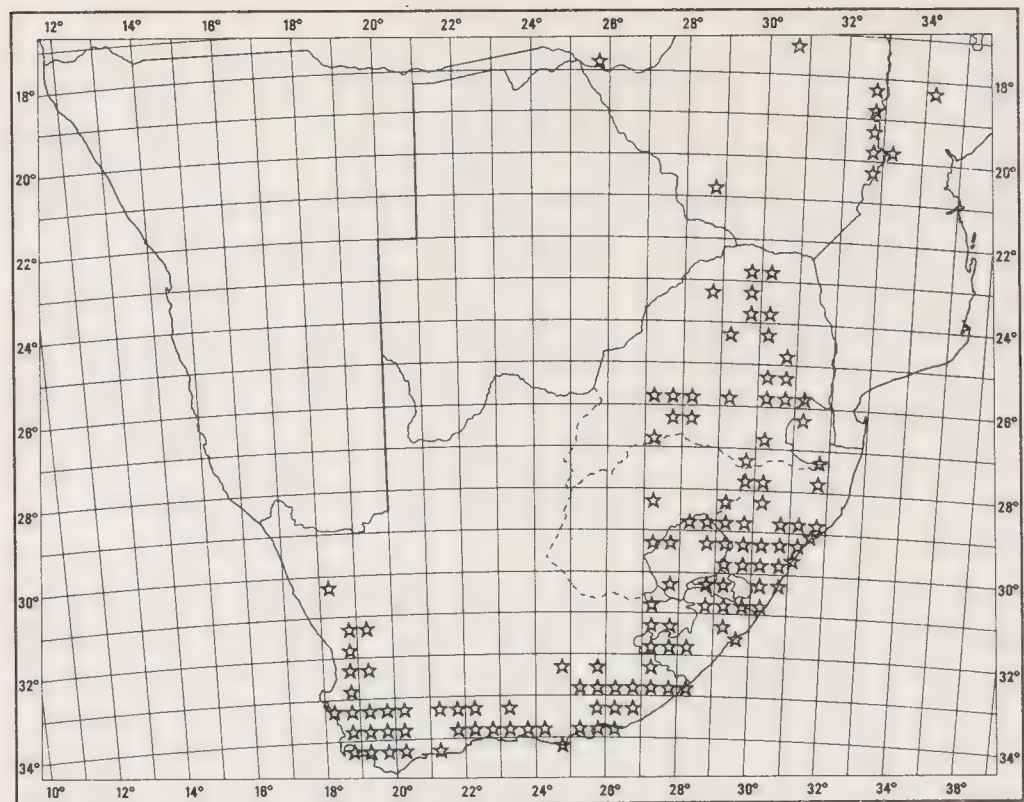
A very variable species.

2. **Mohria hirsuta** J. P. Roux in Jl S. Afr. Bot. 50: 435, t. 1A-E, t. 2A-C (1984). Type: Orange Free State, Tshesheng, Qwa Qwa, near cave on road to the Sentinel, *Roux* 907 (NBG, holo.; K; PRE).



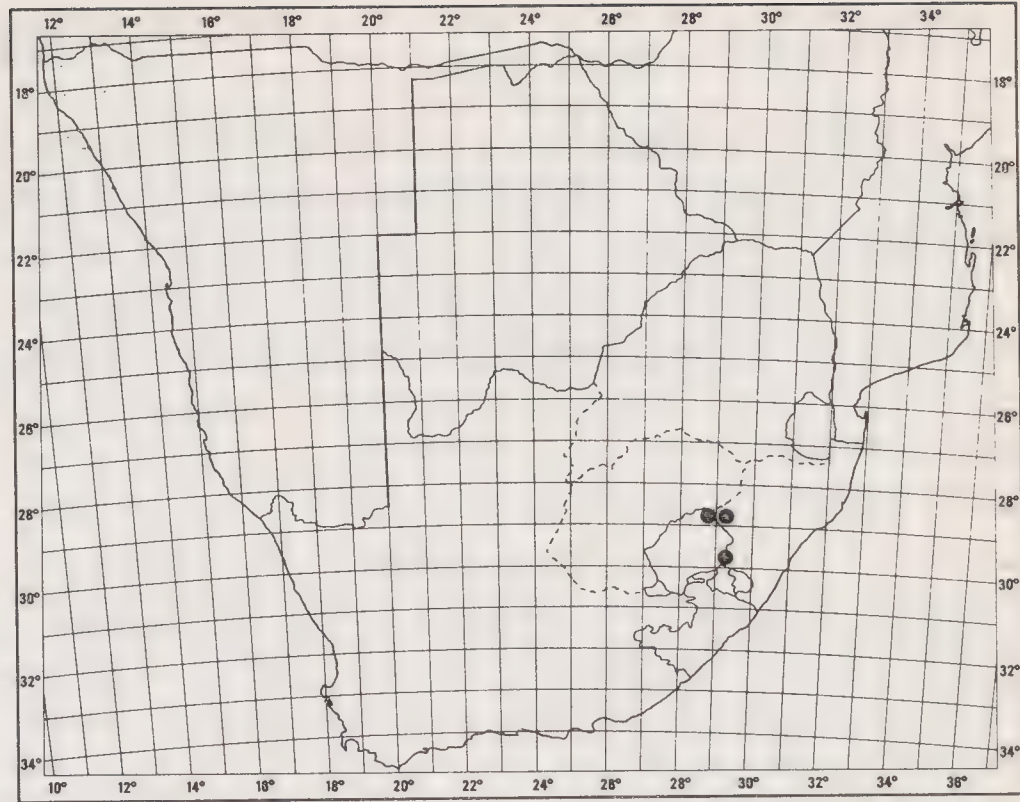






MAP 38.—*Mohria caffrorum*

Rhizome short, prostrate, up to 3 mm in diameter, sparsely set with scarious, linear to narrowly lanceolate, entire, white to brown rhizome-scales up to  $3 \times 0,8$  mm. *Fronds* tufted, erect; *stipe* terete, pale brown, sparsely set with scarious, narrowly lanceolate, entire, pale brown scales; *lamina* oblanceolate to linear-attenuate, 2-pinnatifid, basal pinnae somewhat reduced; *pinnae* widely spaced basally, more closely spaced apically, overlapping in sterile fronds, ovate to lanceolate; *pin-*



MAP 39.—*Mohria hirsuta*

*nules* crowded and overlapping in sterile fronds, distant when fertile, rotund to ovate-obtuse, less deeply lobed towards base and apex, sparsely to densely hirsute with uniseriate white hairs up to 1 mm long. *Sporangia* borne near apices of lobes of apical pinnae only.

Lesotho, Orange Free State and Natal; confined to the Natal Drakensberg, forming large colonies in shallow soils in exposed conditions, 2 000 to 2 800 m altitude. Map 39.

Vouchers: *Hilliard & Burt* 14927 (BOL; E; NU); *Roux* 1214 (NBG); 1457 (NBG); 1508 (NBG).

4. LYGODIUM

**Lygodium** Swartz in J. Bot., Gött. 1800, 2: 7, 106 (1801); Engl., Pflanzenw. Afr. 2: 62 (1908); Tardieu-Blot in Fl. Madag. 8: 4 (1952); in Mém. Inst. fr. Afr. noire 28: 32 (1953); Alston in F.W.T.A. edn 2, Suppl. 22 (1959); Tardieu-Blot in Fl. Gabon 8: 44 (1964); in Fl. Camer. 3: 61 (1964); Schelpe in F.Z. Pterid.: 57 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 33 (1973); in C.F.A. Pterid.: 50 (1977), nom. conserv. Type species: *L. scandens* (L.) Swartz (= *Ophioglossum scandens* L.).

Rhizome horizontal, dichotomous, covered with dark multicellular hairs. *Fronds* climbing, with slender twisting rhachis. *Pinnae* (secondary rhachis branches) borne in pairs along rhachis on short secondary rhachises ending in an aborted bud between pinnae, pinnate to 3-pinnatifid. *Sporangia* borne along margins of pinnule lobes, each sporangium subtended by an indusium.

A tropical and subtropical genus of c. 30 species (Tryon & Tryon, 1982).

Pinnae (secondary rhachis branches) pinnate, oblong, pinnules articulated; veins glabrous ..... 1. *L. microphyllum*  
Pinnae 2-pinnate to 3-pinnatifid, deltate, pinnules not articulated; veins hairy ..... 2. *L. kerstenii*

1. **Lygodium microphyllum** (Cav.) R. Br., Prodr. Fl. Nov. Holl. 1: 162 (1810); Schelpe in F.Z. Pterid.: 57, t. 16B (1970); in C.F.A. Pterid.: 50 (1977); W. B. G. Jacobsen,

Ferns Sthn Afr. 179, t. 121 (1983). Type: Philippine Ilands, Luzon, *Nee* s.n. (MA, holo.).

*Ugena microphylla* Cav., Icon. 6: 76, t. 595 fig. 2 (1801).

FIG. 15.—1, *Lygodium microphyllum*, sterile portion of frond,  $\times 0,6$ ; 1a, fertile portion of frond,  $\times 0,6$ ; 1b, enlargement of fertile lobe,  $\times c. 9$  (Rodin 4703). 2, *Lygodium kerstenii*, sterile portion of frond,  $\times 0,6$  (Plowes 2043); 2a, fertile portion of frond,  $\times 0,6$  (Schelpe 5465). 3, *Mohria caffrorum*, part of plant,  $\times 0,6$ ; 3a, detail of lower surface of pinnule,  $\times 2,4$ ; 3b, frond scale,  $\times c. 15$  (Wolley-Dod 589).



*Lygodium scandens* sensu Sim, Ferns S. Afr. edn 2: 302, t. 161, 162 (1915), non (L.) Swartz.

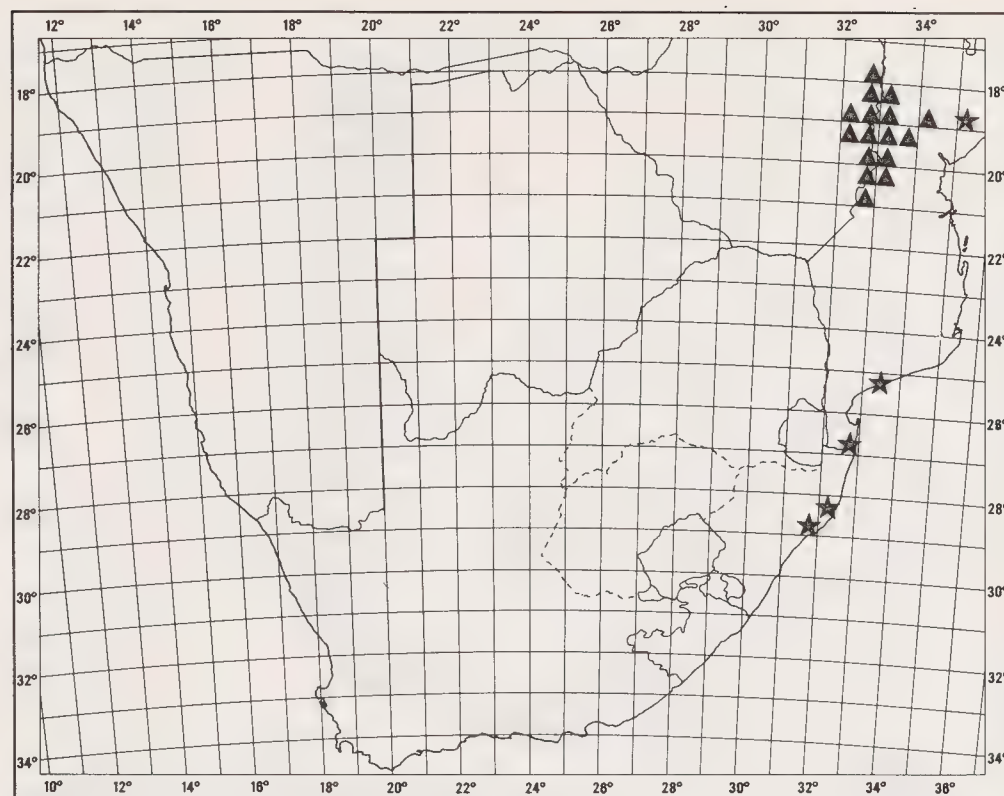
Rhizome subterranean, 3 mm in diameter, producing fronds 40–130 mm apart; hairs on rhizome c. 1,5 mm long. *Fronds* up to  $10 \times 0,30$  m, twining, matt grey-green, up to 2 mm in diameter, producing secondary rhachises; *aborted apical bud* densely dotted with brown multicellular hairs 1–4 mm long; *sterile pinnules* petiolate, lanceolate to oblong-lanceolate, up to  $62 \times 18$  mm, base cordate, apex acute to acuminate, glabrous, margin minutely crenate, *veins* free; *fertile pinnules* broadly lanceolate to oblong,  $15\text{--}45 \times 10\text{--}18$  mm (excluding fertile lobes), base cordate, apex acute to rounded, glabrous, margin minutely crenate with fertile linear lobes up to  $8 \times 1$  mm, produced at irregular intervals, bearing up to 25 sporangia in 2 rows. Fig. 15: 1.

Natal, Mozambique, Zambia, Angola, Zaire, Tanzania, Kenya, Uganda, Central African Republic, Cameroun, Nigeria, Ghana, Liberia, Sierra Leone, as well as tropical Asia and America. Twining climber in moist forest, up to 1 035 m altitude. Map 40.

Vouchers: Aitken & Gale 3 (PRE); Rodin 4703 (BOL; K); Taylor 2585 (BOL; NBG); Ward 2388 (BOL; NPB; NU).

2. *Lygodium kerstenii* Kuhn, Fil. Deck. 28 (1867); Sim, Ferns S. Afr. edn 2: 303, t. 163 (1915); Schelpe in F.Z. Pterid.: 57, t. 16A (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 181, t. 122 (1983). Type: Madagascar, Nosibe, Kersten 75 (B, lecto.!).

Rhizome creeping, up to 4 mm in diameter; hairs on rhizome c. 1,5 mm long. *Fronds* up to  $20 \times 0,48$  m; *rhachis* matt pale brown to greyish green, up to 3 mm in diameter, producing secondary rhachises up to 10 mm long at



MAP 40.—★ *Lygodium microphyllum*  
▲ *Lygodium kerstenii*

intervals of 70–200 mm each; *aborted apical bud* densely set with brown multicellular hairs 1,5 mm long; secondary and tertiary rhachises with narrowly winged, petiolate, non-articulate, lanceolate-oblong to lanceolate, pinnate to 2-pinnatifid; *sterile pinnules* up to 110 mm long, ultimate segments usually with prominent basal lobes, apices broadly acute, margins both coarsely crenate and with crenations finely crenate, veins set with hairs; *fertile pinnules* produced into numerous linear fertile lobes, each bearing up to 20 sporangia in 2 rows. Fig. 15: 2.

Natal (precise locality unknown), Swaziland, Zimbabwe, Mozambique, Zambia, Madagascar and Comoro Islands. Twining climber in gallery forest, up to 1 280 m altitude. Map 40.

Vouchers: Burrows & Schultz 1692 (BOL; NBG); Sutherland s.n. (BOL).

## MARSILEACEAE

Small aquatic or semi-aquatic ferns with a creeping, branched, solenostelic rhizome. *Fronds* circinnate when young, with 4 pinnae in a terminal cluster, arranged symmetrically cross-wise at apex of stipe, floating in submerged plants, otherwise erect or decumbent. *Pinnae* herbaceous, obdeltate to obovate, rarely narrowly deltate, outer margin entire, sinuate, crenate or lobate; *veins* dichotomously branched, anastomosing, often with interstitial suberous streaks on lower surface (in submerged plants), sometimes with sclerenchymatous interstitial pellucid streaks (*M. coromandelina*). *Sporangia* contained in closed sporocarps inserted on short pedicels on stipe (usually at very base), this insertion forming a raphe; *sporocarps* thick-walled, sometimes with conspicuous lateral ribs, venation (visible on inner surface) free or anastomosing, apex of raphe sometimes bearing one or two teeth; *sori* numerous on a gelatinous string-like receptacle attached to wall of sporocarp and released in the form of a ring when moistened. *Spores* of 2 kinds: solitary megaspores and numerous microspores (contained in megasporangia and microsporangia respectively).



## MARSILEA

**Marsilea** L., Sp. Pl. 1099 (1753); Gen. Pl. edn 5: 485 (1754); Engl., Pflanzenw. Afr. 2: 65 (1908); Tardieu-Blot in Fl. Madag. 10: 1 (1952); in Mem. Inst. fr. Afr. noire 50: 11 (1957); Alston in F.W.T.A. edn 2, Suppl. 24 (1959); Tardieu-Blot in Fl. Camer. 3: 57 (1964); Launert in Senckenberg. biol. 49: 274 (1968); in F.S.W.A. 11: 1 (1969); in F.Z. Pterid.: 59 (1970); Schelpe in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 35 (1973); Launert in C.F.A. Pterid.: 51 (1977). Type species: *M. quadrifolia* L.

## Description as for family.

A cosmopolitan genus of about 65 species. All the Southern African species are adapted to essentially the same ecological conditions, i.e. seasonally wet habitats such as temporary vleis, and can be found in shallow or sometimes running water, dry streambeds, and dams, temporarily flooded grassland depressions, often forming large colonies. There is considerable seasonal variation in the size of the fronds. Long stipes and large pinnae are produced during the aquatic phase in deep water. When the water body dries out these larger fronds with longer stipes lie on the exposed mud and smaller fronds with shorter stipes and smaller pinnae — and subsequently sporocarps — are produced from the rhizomes. The sporocarps are extremely drought resistant.

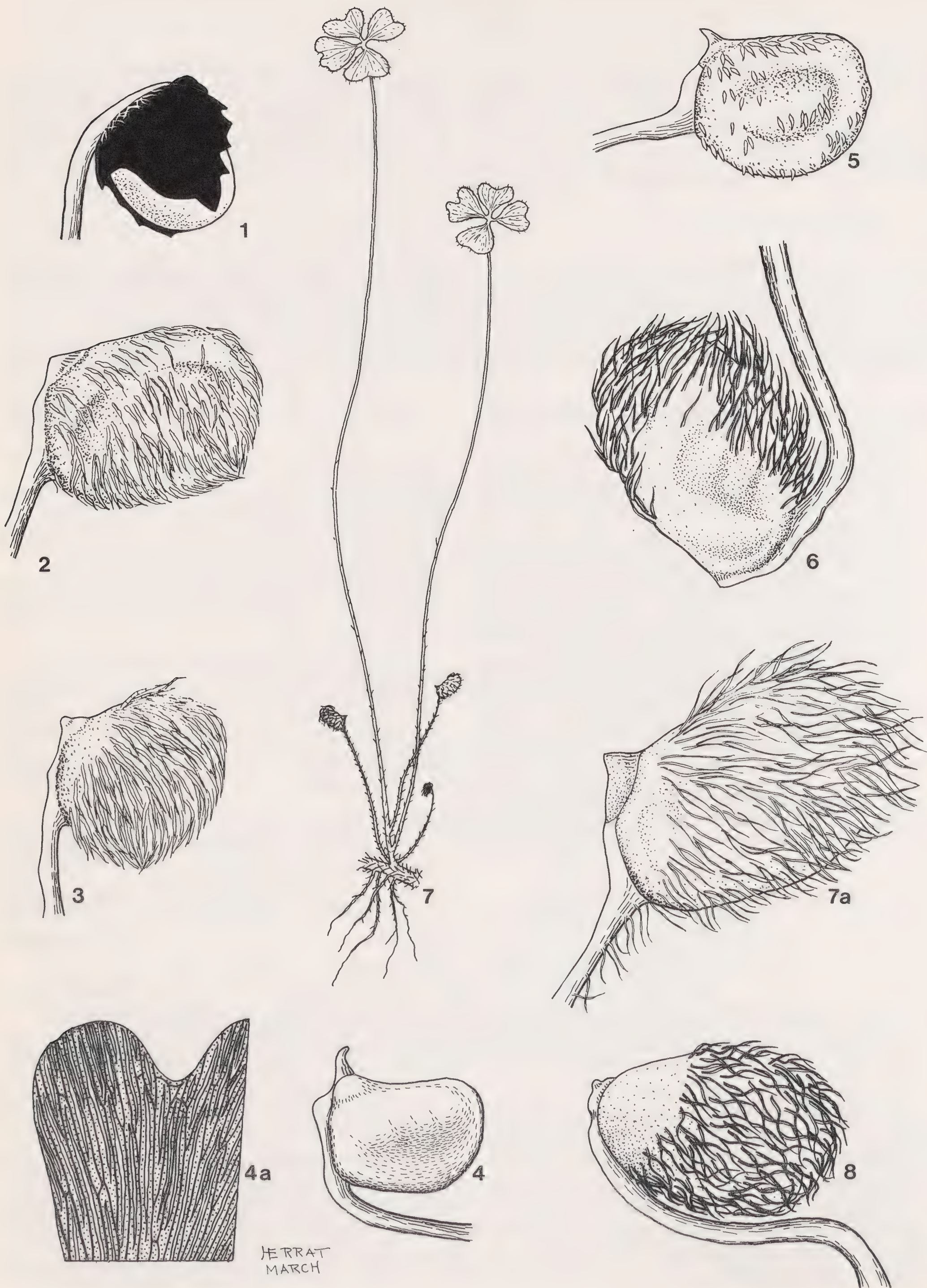
- 1a Sporocarps borne in a cluster on a much branched pedicel..... 4. *M. ephippiocarpa*
- 1b Sporocarps borne on unbranched pedicels:
  - 2a Two or three (rarely four) sporocarp pedicels united basally to a varying degree..... 5. *M. minuta*
  - 2b Sporocarp pedicels always free:
    - 3a Mature sporocarps black, glistening; epidermis becoming detached ..... 1. *M. nubica*
    - 3b Mature sporocarps brownish, not glistening, often densely covered with hair-like scales; epidermis not becoming detached:
      - 4a Sporocarps directed downwards into substratum or pedicel strongly curved or twisted:
        - 5a Pinnae with pellucid streaks between veins; pedicel curved and twisted; superior tooth completely absent or present as a dark spot ..... 2. *M. distorta*
        - 5b Pinnae without pellucid streaks; pedicel straight or only slightly curved; superior tooth always present ..... 14. *M. vera*
      - 4b Sporocarps on more or less erect pedicels which are not conspicuously twisted:
        - 6a Pinnae, at least basally, densely villous:
          - 7a Sporocarps globose, densely covered in reddish tomentum with hairs of one kind ..... 13. *M. villifolia*
          - 7b Sporocarps oblong, sparsely pubescent with hairs of two kinds ..... 8. *M. farinosa*
        - 6b Pinnae pubescent or glabrous:
          - 8a Sporocarps conspicuously saddle-shaped ..... 7. *M. aegyptiaca*
          - 8b Sporocarps subspherical to oblong, not saddle-shaped:
            - 9a Sporocarps directed upwards at an oblique angle to pedicel ..... 11. *M. schelpeana*
            - 9b Sporocarps borne at right angles to pedicel or directed downwards:
              - 10a Pinnae with pellucid streaks between veins:
                - 11a Sporocarps bordered; lateral ribs distinct; teeth subequal ..... 3. *M. coromandelina*
                - 11b Sporocarps not bordered; lateral ribs almost invisible in mature sporocarps; superior tooth a conspicuous horn ..... 6. *M. fenestrata*
              - 10b Pinnae without pellucid streaks:
                - 12a Sporocarps orbicular in outline ..... 16. *M. burchellii*
                - 12b Sporocarps oblong in outline:
                  - 13a Sporocarps elliptic in dorsiventral cross-section ..... 15. *M. capensis*
                  - 13b Sporocarps laterally compressed or concave:
                    - 14a Sporocarps distinctly concave in dorsiventral cross-section; lateral ribs prominent ventrally; superior tooth conical, almost always acute ..... 10. *M. unicornis*
                    - 14b Sporocarps rectangular or only slightly concave in dorsiventral cross-section; lateral ribs hardly visible in mature specimens; superior tooth obtuse to subacute:
                      - 15a Raphe covering almost entire base of sporocarp; sori 6–8 ..... 12. *M. apposita*
                      - 15b Raphe covering  $\frac{1}{2}$ – $\frac{1}{3}$  of base of sporocarp; sori 8–12 ..... 9. *M. macrocarpa*

1. **Marsilea nubica** A. Br. in Mber. K. preuss. Akad. Wiss. Berl. 1863: 432 (1864); Launert in Senckenberg. biol. 49: 281, t. 10–13 (1968); in F.S.W.A. 11: 4 (1969); in C.F.A. Pterid.: 57, t. 7G (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 475, t. 354 (1983). Type: Sudan, Arasch-Cool, Kotschy 126 (B, holo.!, BM!, FR; K!, L; M; PR).

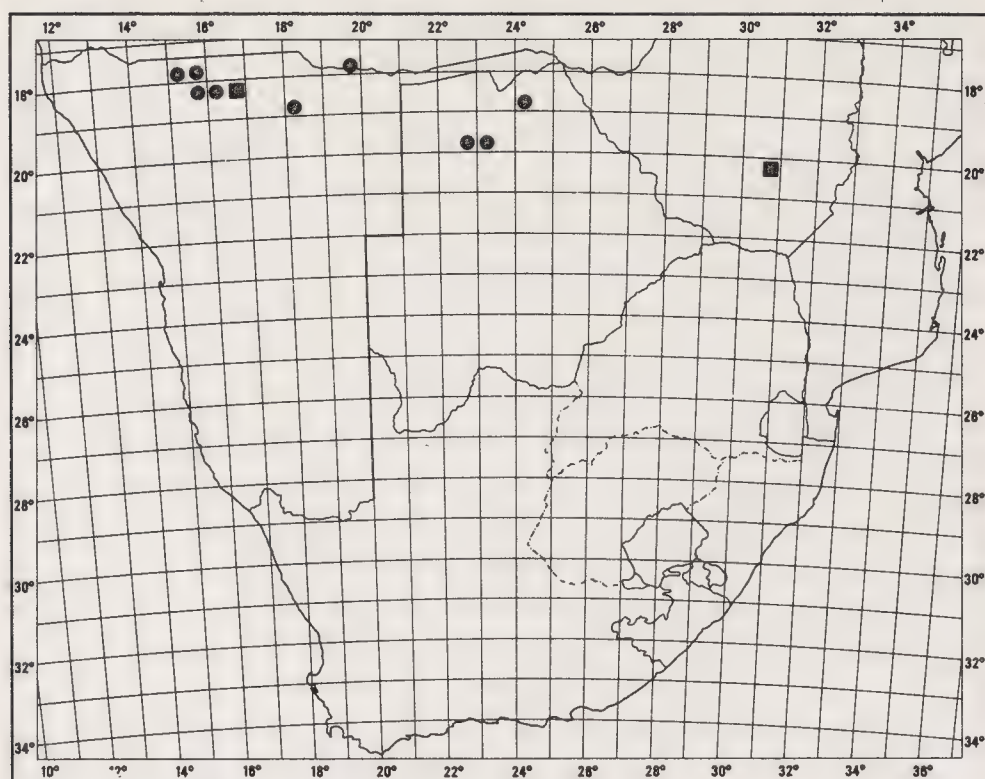
*Zalusianskya nubica* (A. Br.) Kuntze, Rev. Gen. 2: 823 (1891).

Stipes slender, glabrous, 20–180 mm long. Pinnae variable, outer margin rounded, entire, floating forms with short or long brown suberous streaks between veins of under surface. Pedicels free, straight or curved c. 0.5–2.5 mm long, at an angle varying from 90°









MAP 41. —● *Marsilea nubica*  
■ *Marsilea distorta*

to 30°. *Sporocarps* very variable in shape, dark black and usually shiny, outer black layer of epidermis becoming detached and peeling off; *lateral ribs* not apparent; veins (seen interiorly) not anastomosing; *raphe* distinct, fully developed along entire sporocarp base; *inferior tooth* not developed; *superior tooth* just indicated as tiny dot on broadly cone-shaped base, visible only after detachment of epidermis; *sori* 4–5. Fig. 16: 1.

South West Africa/Namibia and Botswana, as well as Madagascar, Tanzania, Sudan, Central African Republic, Chad, Mauritania and Mali. Map 41.

Vouchers: Schweickerdt 2180 (BM; BOL; K; M; NU; PRE; PRU; WIND); Schweickerdt 2184 (BM; BOL; M; NU; PRE; PRU); Smith 1988 (BOL; GAB; SRGH); Van Jaarsveld 2999 (NBG).

2. *Marsilea distorta* A. Br. in Mber. K. preuss. Akad. Wiss. Berl. 1863: 433 (1864); Launert in Senckenberg, biol. 49: 284, t. 14–16 (1968); W. B. G. Jacobsen, Ferns Sthn. Afr. 476 (1983). Type: Senegal, near Dagana-Ouallo, Leprieur s.n. (B, holo.; FR; L; P).

Stipes slender, wiry, erect, usually glabrous, c. 10–100 mm long. *Pinnae* usually slightly asymmetrical, flanks concave or straight, outer margin irregularly crenate or dentate, with long pellucid streaks between the veins. *Pedicels* free, flexuose, conspicuously curved and twisted, often encircling sporocarp.

*Sporocarps* usually crowded at very base of stipe, broadly elliptic to oblong-elliptic in lateral view, elliptic in dorsiventral cross-section, not bordered, always densely brownish tomentose; *lateral ribs* 6–12, apparent; veins (seen interiorly) not anastomosing; *raphe* distinct, attached to 1/5–1/3 of sporocarp base; *inferior tooth* prominent, appearing as somewhat recurved apex of raphe; *superior tooth* just represented as a dark circular area; *sori* c. 10–14.

South West Africa/Namibia, Zimbabwe, Tanzania, Mauritania, Chad, Senegal and Liberia. Map 41.

Voucher: Tinley 1183 (WIND).

3. *Marsilea coromandelina* Willd., Sp. Pl. edn 4, 5: 539 (1810); Launert in Senckenberg. biol. 49: 285, t. 17–23 (1968); in F.S.W.A. 11: 3 (1969); in C.F.A. Pterid.: 54, t. 7E (1977); W. B. G. Jacobsen, Ferns Sthn. Afr. 477, t. 355 (1983). Type: India, Tranquebar, Klein s.n., Herb. Willdenow no. 20253 (B, holo.).

*Marsilea trichocarpa* Brem. in Ann. Transv. Mus. 15: 234 (1933). Type: Transvaal, Pietersburg, Vivo Vlei, Bremekamp & Schweickerdt 193 (PRE, holo.; BM!; K!).

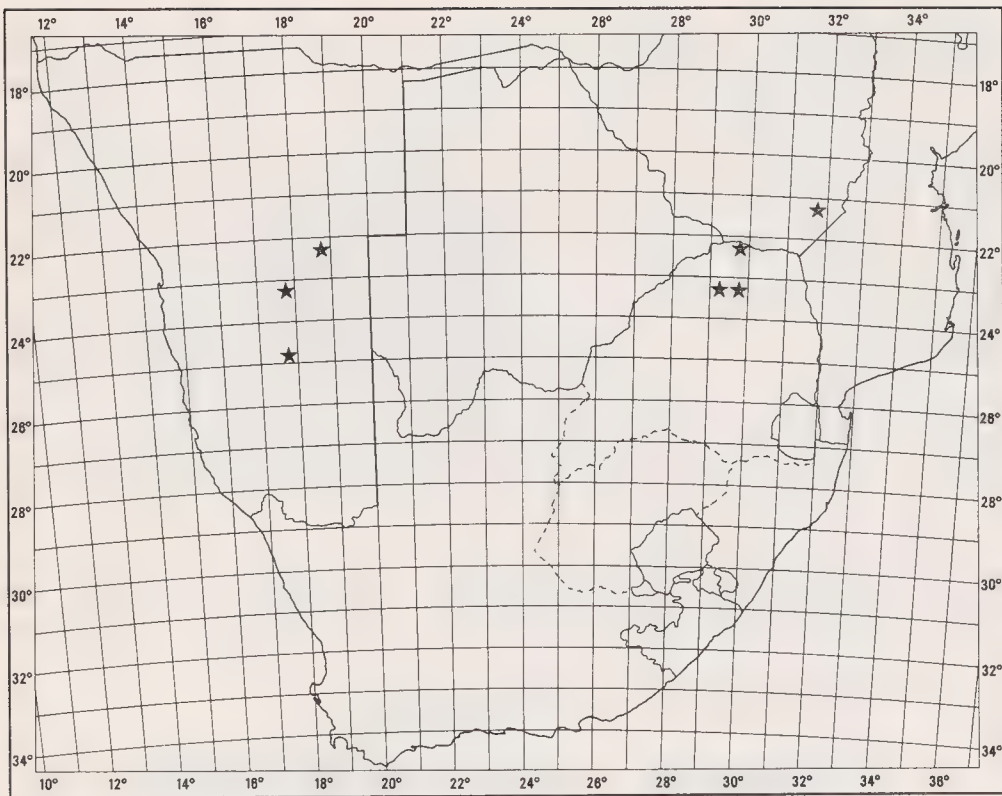
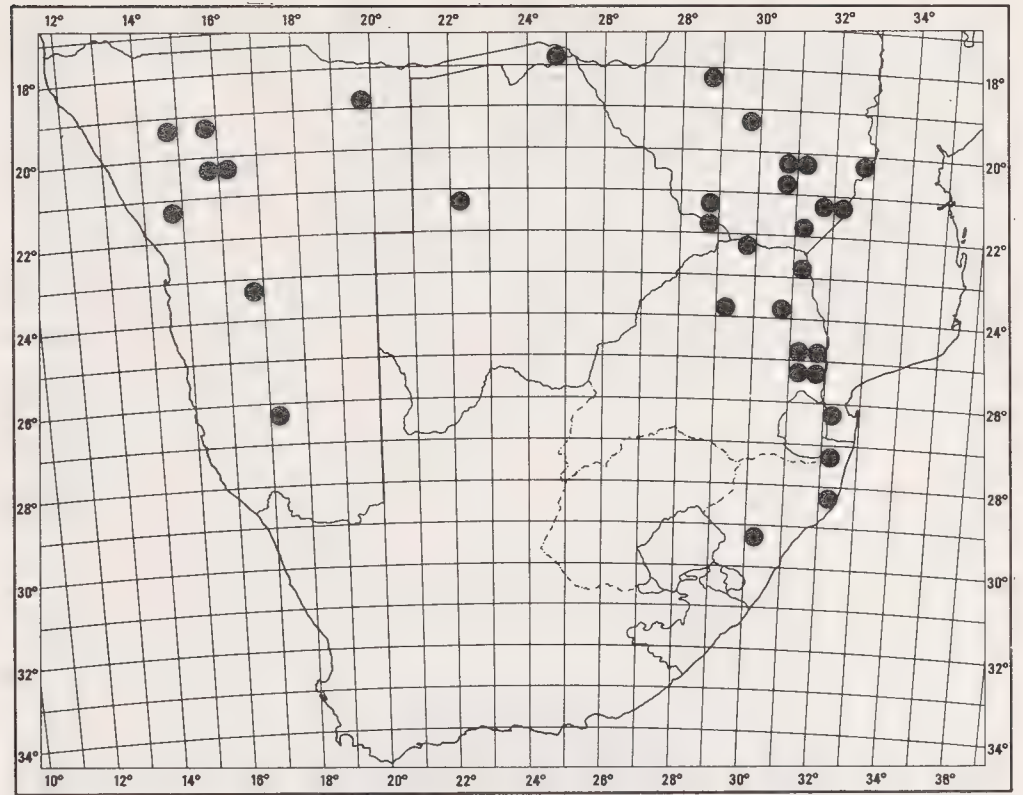
Stipes slender, filiform, usually glabrous, c. 10–90 mm long. *Pinnae* narrowly cuneate to obdeltate, glabrous to occasionally sparsely pilose, 2–8 × 1,25–8 mm, with pellucid streaks between veins, flanks usually straight, outer margin round entire, occasionally crenate to bilobed. *Pedicels* wiry, flexible, straight or gently curved, free 5–15 mm. *Sporocarps* usually solitary, subcircular to broadly elliptic in lateral view, lemon-shaped in dorsiventral cross-section, conspicuously bordered with bulging sides, appressed pilose at first, becoming glabrous at maturity, 2–3,75 × 1,5–2,5 × 1,75 mm thick; *lateral ribs* usually prominent; *raphe* distinct; *inferior tooth* obtuse, usually downward-pointing; *superior tooth* broadly conical, obtuse to subacute; *sori* 8–12.

Angola, South West Africa/Namibia, Transvaal and Madagascar, as well as Zimbabwe, Kenya, Tanzania, Burundi, Senegal, Mauritania, Sudan, Socotra and India. Map 42.

Vouchers: Bremekamp & Schweickerdt 193 (BM; K; PRE; PRU); Leippert 4688 (M; WIND).

FIG. 16.—1, *Marsilea nubica*, sporocarp, × 7,2 (Schweickerdt 2180). 2, *M. macrocarpa*, sporocarp, × 7,2 (Isaac sub BOL 26548). 3, *M. burchellii*, sporocarp, × 7,2 (Schelpe 5915a). 4, *M. fenestrata*, sporocarp, × 7,2; 4a, section of leaflet showing pellucid streaks, × 7,2 (Ward 2458). 5, *M. unicornis*, sporocarp, × 7,2 (Schweickerdt 2202). 6, *M. vera*, sporocarp, × 7,2 (Schweickerdt 2200). 7, *M. schelpeana*, part of plant, × 0,6; 7a, sporocarp, × 7,2 (Liversidge sub BOL 26551). 8, *M. villifolia*, sporocarp after Launert (1968), × 2,4.



MAP 42.—*Marsilea coromandelina*MAP 43.—*Marsilea ephippiocarpa*

4. *Marsilea ephippiocarpa* Alston in J. Bot., Lond. 68: 118 (1930); Launert in Senckenberg. biol. 49: 289, t. 29–31, 67 (1968); in F.S.W.A. 11: 3 (1969); in F.Z. Pterid.: 62, t. 17A (1970); in C.F.A. Pterid.: 54, t. 7B (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 478, t. 27, 356 (1983). Type: Zimbabwe, near Fort Victoria, *Rendle* 307 (BM, holo.!).

Stipes bright green, c. 30–150 mm long. *Pinnæ* greyish pubescent when young, later usually glabrous, extremely variable in shape and size, outer margin always rounded, entire, wavy-edged, irregularly crenulate to deeply crenate, sometimes deeply lobed, usually only emarginate or retuse. *Pedicels* adnate, a peduncle-like base branching dichotomously; peduncle up to 6 mm long; individual pedicels c. 1–1½ times as long as sporocarps. *Sporocarps* in dense clusters of 3 to many at nodes, typically saddle-shaped, dorsally almost always deeply concave, ventrally rounded, oblong to elliptic in dorsiventral cross-section, 2–3,5 × 2–4 × 0,5–1,5 mm thick; *lateral ribs* not visible in mature specimens; *inferior tooth* not present (or just indicated by a shallow hump); *superior tooth* conspicuous, short.

Angola, South West Africa/Namibia, Botswana, Natal, Transvaal and Zimbabwe. Map 43.

Vouchers: Codd & De Winter 4975 (PRE); Dinter 7207 (B; BM; BOL; FR; K; M; PRE; PRU; WIND); Drummond 8250 (BOL; SRGH); Ward 2517 (BM; NPB; NU).

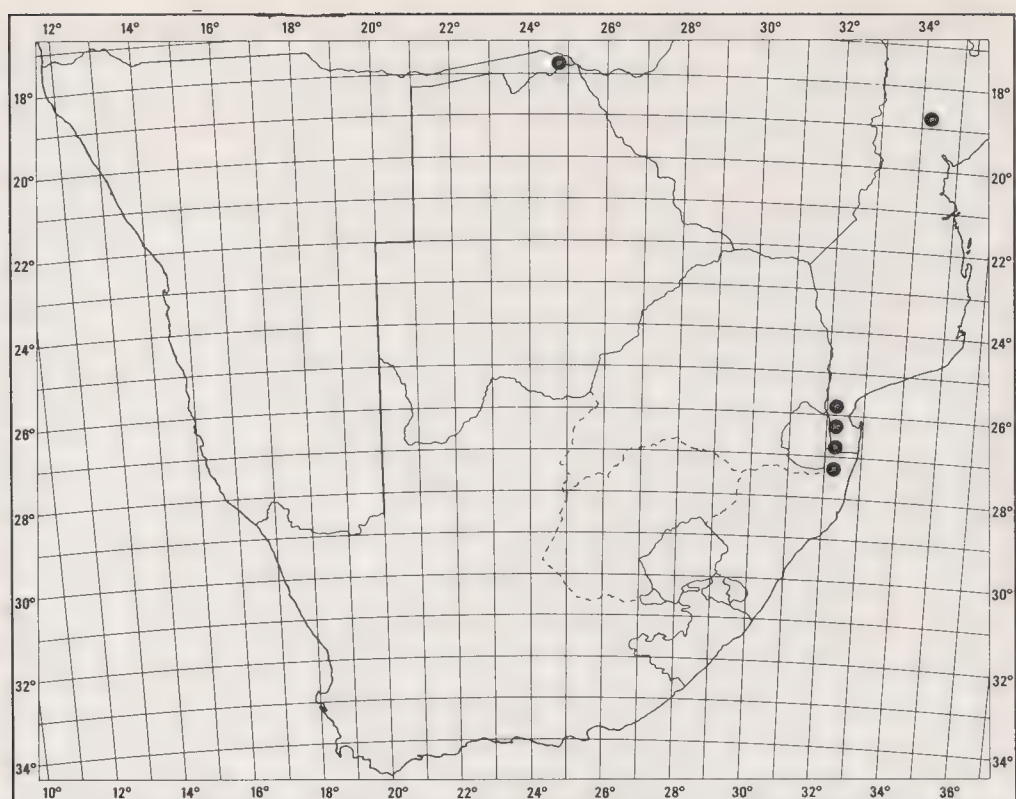
5. *Marsilea minuta* L., Mant. Alt. 308 (1771); Launert in Senckenberg. biol. 49: 291, t. 32–34, 69 (1968); in F.Z. Pterid.: 60, t. 17B (1970); Schelpe in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid. 36 (1973); Launert in C.F.A. Pterid.: 55 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 479, t. 357 (1983). Type: India (LINN 1254/6, holo.).

Stipes slender, usually glabrous. *Pinnæ* obdeltate to broadly obdeltate, usually glabrous, with brownish suberous streaks on under surface between veins of floating pinnæ, flanks usually straight to convex, outer margin round, entire in floating ones, entire or sinuate or crenulate in aerial or subaerial pinnæ. *Pedicels* terete, fairly stout, c. 3–7 mm long, erect or gently curved upwards, free or united to some extent with 2 or 3 others, usually inserted at very base of stipe. *Sporocarps* usually crowded (very rarely solitary), extremely variable in size, distally always rounded, elliptic in dorsiventral cross-section, without dorsal or frontal furrow or suture; *lateral ribs* usually invisible; *teeth* very prominent; *sori* 8–12.

Natal, Mozambique, Malawi, Zambia, Angola, Zaire, Burundi, Tanzania, Kenya, Uganda, Sudan, Central African Republic, Chad, Nigeria, Benin, Ghana, Guinea Bissau, Senegal, Mali, Algeria, Madagascar and Comoro Islands. Map 44.

Voucher: Milton 20 (BOL); Ward 3118 (NPB; NU).





MAP 44.—*Marsilea minuta*

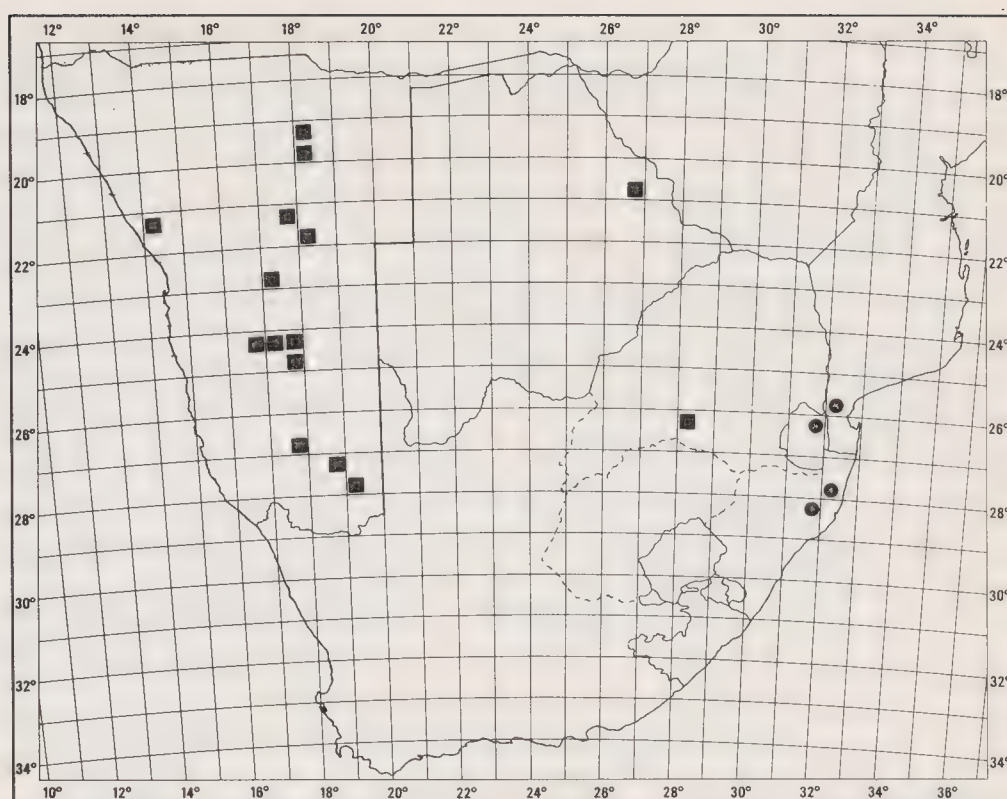
6. *Marsilea fenestrata* Launert in Mitt. Bot. StSamml., Münch. 3: 507, t. 2 (1960); in Senckenberg. biol. 49: 294, t. 35–37 (1968); W. B. G. Jacobsen, Ferns Sthn Afr. 480, t. 358 (1983). Type: Natal, Umfolozi Game Reserve, Ward 2458 (BOL, holo.!, BM!; NPB!; NU!).

Stipes rather slender, c. 50–120 mm long. *Pinnae* obdeltate to broadly obdeltate, flanks straight or slightly convex, outer margin emarginate to irregularly crenate; usually glabrous, with longitudinal pellucid streaks between the veins. *Pedicels* robust, curved or straight, erect or ascending, 2.5–3 mm long. *Sporocarps* in dense groups at very base of stipes, subrectangular in lateral view, narrowly elliptic in dorsi-ventral cross-section, dorsally slightly inwardly curved to almost straight, ventrally curved; *lateral ribs* 4–7, almost invisible at maturity; *lateral veins* (seen interiorly) not anastomosing; *raphe* distinct, attached to entire sporocarp base; *inferior tooth* obtuse, not very prominent; *superior tooth* very conspicuous; *sori* 7–8. Fig. 16: 4.

Natal, Swaziland and southern Mozambique. Map 45.

Vouchers: *Compton* 29735 (Swaziland); *Wager* s.n. (BOL; NH); *Ward* 3195 (NPB; NU).

7. *Marsilea aegyptiaca* Willd. in L., Sp. Pl. edn 4, 5: 540 (1810); Launert in Senckenberg. biol. 49: 296, t. 38–40 (1968); in F.S.W.A. 11: 3 (1969); in F.Z. Pterid.: 62, t. 18E (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 481, t. 359 (1983). Type lost. Launert (1968) suggested *Schimper & Wiest* 33 from



MAP 45.—● *Marsilea fenestrata*  
■ *Marsilea aegyptiaca*

Egypt as a standard specimen as he felt no need for creating a neotype (BM; BR; FR; K; L; M; PR).

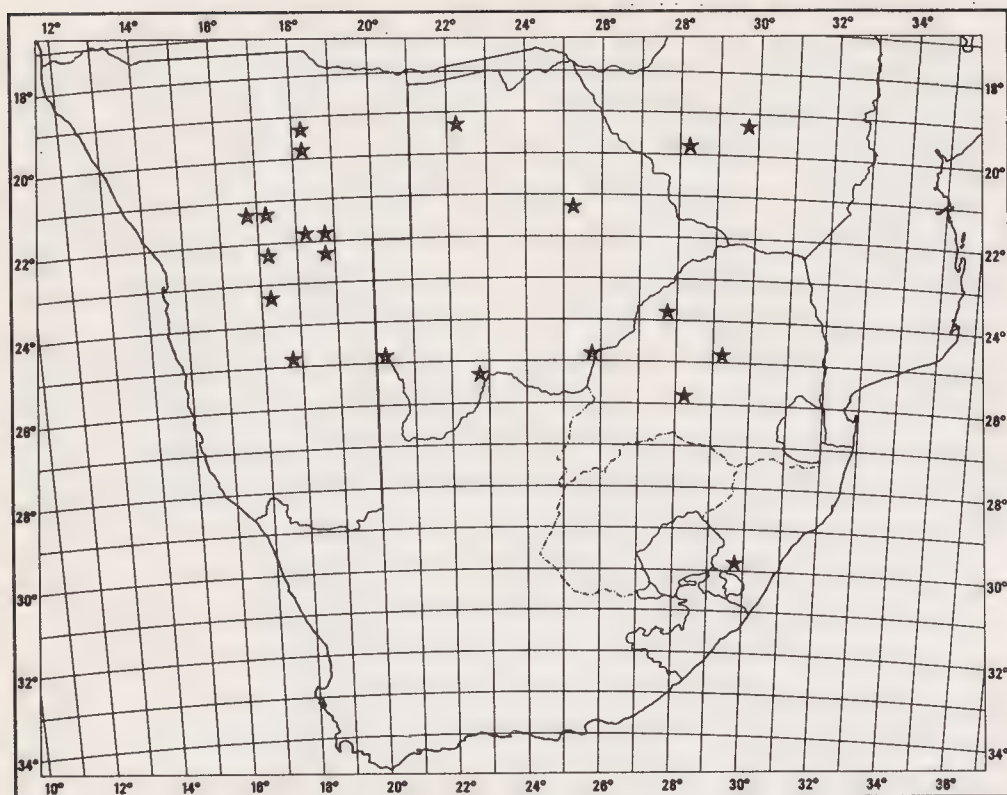
Stipes slender, greenish, hairy, becoming glabrous with age. *Pinnae* extremely variable, with longitudinal brown suberous streaks on lower surface in floating pinnae. *Pedicels* always free, somewhat stout, curved or straight, c. 3–8 mm long. *Sporocarps* solitary or more often in dense groups of 2 to many clustered at very base of stipe, 1–2 mm thick, square to rectangular in lateral view, sometimes ventrally curved, dorsally straight or saddle-shaped to a varying degree, oblong in frontal view, lateral sides with shallow or deep, slightly curved ventral groove with frontal furrow usually present and often expanded over dorsal side; *raphe* present but often indistinct; *inferior tooth* undeveloped; *superior tooth* always distinct; *sori* 4–6.

South West Africa/Namibia, Botswana, north-western Cape Province and Transvaal, as well as Madagascar, Tunisia, Sudan, Egypt and Ethiopia. Map 45.

Vouchers: *Dinter* 7694 (B; BM; BOL; FR; K; M; PRE; PRU; WIND); *Schweickerdt* 2146; 2148 (BM; BOL; K; M; NU; PRE; PRU; WIND); *Wild* 5115 (SRGH).

8. *Marsilea farinosa* Launert in Senckenberg. biol. 49: 298, t. 41–46, 70–71 (1968); in F.S.W.A. 11: 4 (1969); in F.Z. Pterid.: 65, t. 17C (1970); in C.F.A. Pterid.: 55, t. 7A (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 481, t. 360 (1983). Type: South West Africa/Namibia, Grootfontein, at Sus, *Schönfelder* sub *Dinter* 7688 (M, holo.; B; BM!; BOL!; FR; K!; PRE!; WIND!).



MAP 46.—*Marsilea farinosa*

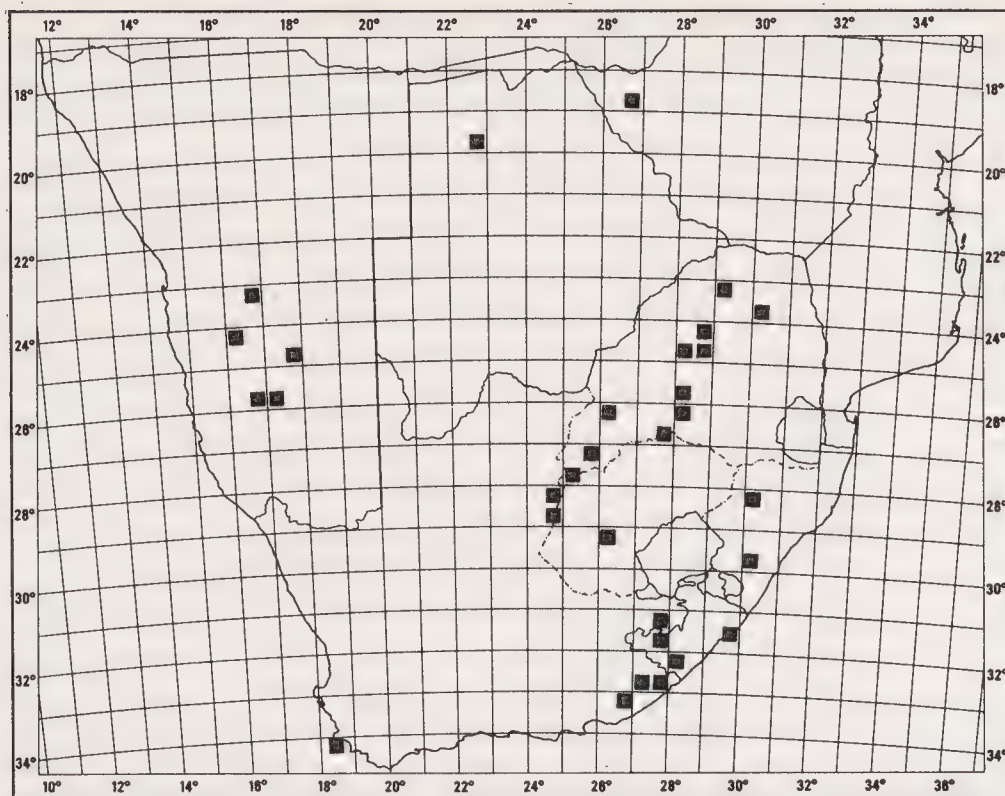
Stipes slender, usually hispid, erect, c. 20–150 mm long. *Pinnae* without pellucid streaks. *Pediceles* usually curved, relatively slender, flexible, usually hispid, erect or ascending, c. 8–15 mm long. *Sporocarps* densely crowded at base of stipe, bean-shaped, usually horizontal, with a furrow along dorsal, frontal and ventral sides, laterally slightly bulging, flat or rarely concave; *lateral ribs* 8–11, inconspicuous at maturity; set with multicellular uniseriate hairs of 2 kinds: basally attached, erect ordinary cylindrical hairs, and flattened hairs laterally attached to surface of sporocarp by usually 1-celled funicle-like stalk; *raphe* present, covering  $\frac{1}{2}$ – $\frac{2}{3}$  of sporocarp base; *inferior tooth* absent (or present as shallow hump); *superior tooth* inconspicuous; *sori* 8–11.

Angola, South West Africa/Namibia, Botswana, northern Cape Province, Natal, Transvaal, Zimbabwe, Mozambique, Tanzania and Ethiopia. Map 46.

Vouchers: *Burt Davy* 4081 (BM; BOL; K); *De Winter* 3517 (K; M; PRE; WIND); *Wild & Drummond* 7263 (BOL; SRGH).

9. *Marsilea macrocarpa* Presl in Abh. K. Böhm. Ges. Wiss., ser. 5, 3: 580 (1845); Sim, Ferns S. Afr. edn 2: 314, t. 171 (1915); Launert in Senckenberg. biol. 49: 300, t. 47–52, 72–73 (1968); in F.S.W.A. 11: 4 (1969); in F.Z. Pterid.: 64, t. 17D (1970); in C.F.A. Pterid.: 56, t. 7D (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 483, t. 361 (1983). Type: Cape Province, *Drège a & b* (PR, holo.; B).

*Zalusianskya macrocarpa* (Presl) Kuntze, Rev. Gen. 2: 823 (1891).

MAP 47.—*Marsilea macrocarpa*

*Marsilea dregeana* A. Br. in Mber. K. preuss. Akad. Wiss. Berl. 1863: 428 (1864). Type as for *M. macrocarpa* Presl.

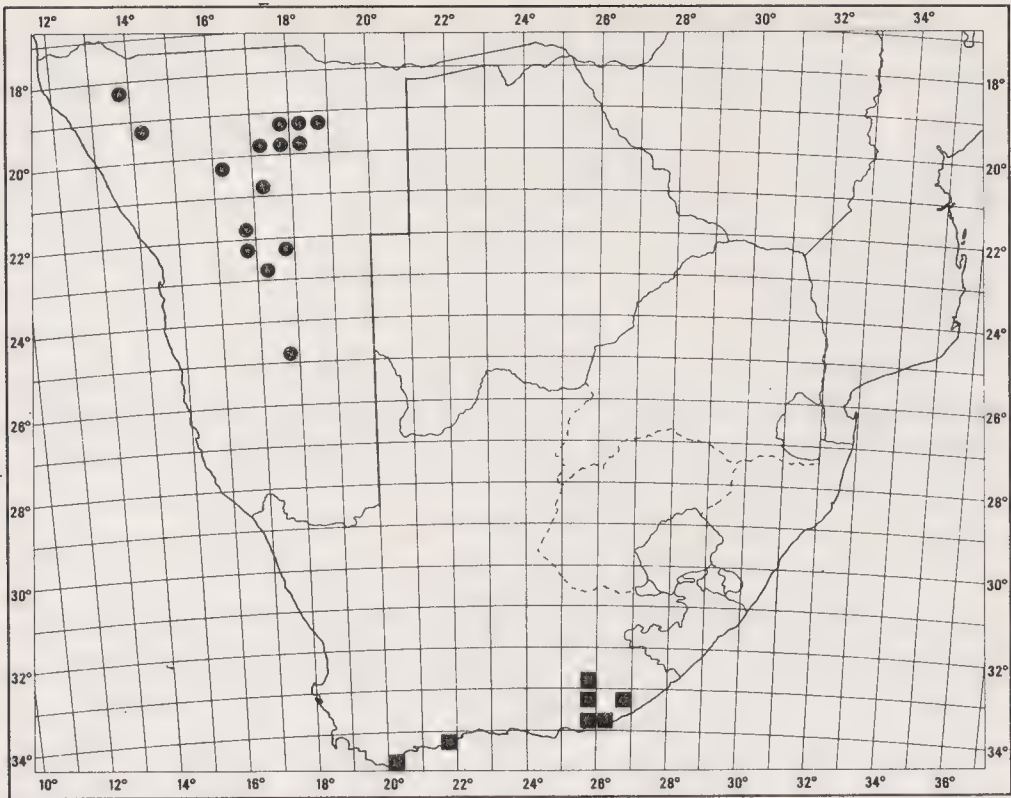
Stipes variable, usually glabrous, somewhat striate. *Pinnae* green with long brown suberous interstitial streaks on under surface of floating pinnae, flanks usually concave, outer margin round, usually entire or sinuate. *Pediceles* free, inserted at very base of stipe, usually erect or ascending, c. 7–12 mm long. *Sporocarps* very variable in size, narrowly rectangular to slightly biscociform in dorsiventral cross-section, not bordered, usually with shallow furrow along dorsal, frontal and sometimes part of ventral side; *lateral ribs* more or less distinct, often disappearing at maturity; *raphe* distinct, covering  $\frac{1}{3}$ – $\frac{1}{2}$  of sporocarp base; *inferior tooth* absent (or present as very shallow hump); *superior tooth* present, rather short; *sori* usually 8–12. Fig. 16: 2.

Angola, South West Africa/Namibia, Botswana, eastern and northern Cape Province, Transkei, Natal, Transvaal, Zimbabwe and East Africa. Map 47.

Vouchers: *Enslin & Schweickerdt* s.n. (NU; PRU 6241); *Kers* 170 (BM; FR; S; WIND); *Pegler* 1528 (BM; BOL; PRE); *Schelte* 5025 (B; BM; BOL; C; GH; K; M; MO; NBG; P; PR; PRE; S; STE; US); *Schlechter* 4675 (BR; BOL; NBG; PRC).

10. *Marsilea unicornis* Launert in Senckenberg. biol. 49: 303, t. 53–54, 74 (1968); in F.S.W.A. 11: 4 (1969); in C.F.A. Pterid.: 56, t. 7C (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 484, t. 362 (1983). Type: South West Africa/Namibia, Tsumeb, *Dinter* 7585 (M, holo!; BM!; BOL!; FR; K!; PRE!; WIND!).





MAP 48.—● *Marsilea unicornis*  
■ *Marsilea schelpeana*

Stipes usually slender and glabrous, c. 60–200 mm long. *Pinnæ* narrow to broadly obdeltate, olive- or greyish green, usually glabrous, flanks usually straight, outer margin bilobed, irregularly crenate, shortly lobate-crenate, or rarely entire. *Pedicels* free, slender, 6–14 mm long. *Sporocarps* solitary at very base of stipe, bean-shaped or rarely lozenge-shaped, biscoctiform in dorsiventral cross-section, almost always with continuous dorsi-fronto-ventral furrow; *lateral ribs* 9–14, usually somewhat prominent ventrally, rarely invisible; *veins* (see interiorly) not anastomosing; *raphe* present, covering  $\frac{2}{3}$ – $\frac{4}{5}$  of sporocarp base; *inferior tooth* absent (or present as very shallow hump); *superior tooth* present, conical, almost always acute, straight or with apex slightly recurved. Fig. 16: 5.

South West Africa/Namibia and Angola. Map 48.

Vouchers: *Dinter* 614 (B; M; SAM); 7585 (BM; BOL; FR; K; M; PRE; WIND); *Giess & Leippert* 7564 (M; NBG; WIND); *Schweickerdt* 2080, 2101 (BM; BOL; K; M; NU; PRE; PRU; WIND).

11. *Marsilea schelpeana* Launert in Mitt. Bot. StSamml., Münch. 3: 506, t. 1 (1960); in Senckenberg. biol. 49: 305, t. 55–57 (1968), as *schelpiana*; W. B. G. Jacobsen, Ferns Sthn Afr. 484, t. 363 (1983). Type: Cape Province, Korsten near Port Elizabeth, *Liversidge* s.n. (BOL 26551, holo.!).

Stipes usually crowded, rarely solitary, slender, flexible, c. 70–200 mm long. *Pinnæ* narrowly obdeltoid to obdeltoid-obovate, flanks slightly convex, outer margins bilobate, cre-

nate, or rarely entire, appressed-pilose at first. *Pedicels* arising from very base of stipe or just above, erect or slightly arching, rather slender, flexible, c. 20–45 mm long. *Sporocarps* solitary or crowded, obliquely ovate-oblong to elliptic in lateral view, narrowly elliptic in dorsiventral cross-section, not bordered, typically inclined at an angle of 115–130° with pedicel; *lateral ribs* not present in mature sporocarps; *veins* (seen interiorly) not anastomosing; *raphe* distinct, attached to  $\frac{1}{2}$ – $\frac{4}{5}$  of sporocarp base; *inferior tooth* almost obsolete; *superior tooth* distinct, prominent. Fig. 16: 7.

Endemic to Cape Province. Map 48.

Vouchers: *Anderson* 28 (B; BOL; C; GH; K; M; MO; P; PR; PRE; S); *Johnson* 1095 (PRE); *Van Jaarsveld* 4982 (NBG).

12. *Marsilea apposita* Launert in Senckenberg. biol. 49: 306, t. 75 (1968); in F.Z. Pterid.: 65 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 485, t. 364 (1983). Type: Zimbabwe, Matopo Hills, *Gibbs* 289 (BM, holo.!.; BOL!).

*Marsilea capensis* sensu Eyles in Trans. R. Soc. S. Afr. 5, 4: 290 (1916). *Marsilea macrocarpa* var. *capensis* sensu Sim, Ferns S. Afr. edn 2: 316, t. 172 fig. 4 (1915).

Stipes obtusely angular, striate, green, scattered-pilose or glabrous, c. 70–300 mm long. *Pinnæ* obdeltate, flanks shallowly concave or straight, outer margin rounded, irregularly crenate or crenate-dentate. *Pedicels* terete, slender, wiry, erect or arching, 2 or 3 (or more), connate at the base, rarely solitary, usually pilose, 8 mm long. *Sporocarps* obtusely rectangular in lateral view, dorsally somewhat concave, ventrally slightly convex, c. 3–4 × 2–3, 25 × 1,5–2 mm thick, rectangular in dorsiventral cross-section (fully mature sporocarps sometimes almost bean-shaped), with continuous shallow dorso-fronto-ventral furrow; *lateral ribs* hardly visible at maturity; *raphe* distinct, covering almost entire sporocarp base; *inferior tooth* absent (or present as very shallow hump); *superior tooth* present, rather short; *sori* 6–8.

Botswana, Transvaal and Zimbabwe. Map 49.

Voucher: *Wager* 169 (PRE).

13. *Marsilea villifolia* Brem. & Oberm. ex Alston & Schelpe in Jl S. Afr. Bot. 18: 566, 166 (1952); Launert in Senckenberg. biol. 49: 307, t. 58–59 (1968); in F.Z. Pterid.: 64, t. 18B (1970); W. B. G. Jacobsen, Ferns Sthn Afr.



486, t. 365 (1983). Type: Botswana, pan south of Kopjes, *Van Son* s.n. sub TRV 1801 C (BOL, holo.!; B!; BM!; K!; PRE!).

*Marsilea villosa* Burch. ex Brem. & Oberm. in Ann. Transv. Mus. 16: 400 (1935), non Kaulf. (1824).

Stipes very robust, up to 2,5 mm in diameter near base, obtusely angular, striate, 70–200 mm long. *Pinnae* broadly obdeltate, olive- or yellowish green, thickly herbaceous, flanks slightly concave, outer margin irregularly crenate, very rarely entire. *Pedicels* very short, appressed-pilose, up to 4 mm long. *Sporocarps* solitary, square to obtusely rectangular in lateral view, rectangular in dorsiventral cross-section, with or without shallow dorsifrontal furrow, densely appressed-pilose, gradually becoming glabrous, 5–6 × 4–5 × 1–1,5 mm thick; *lateral ribs* invisible at maturity; *lateral veins* (seen interiorly) not anastomosing; *raphe* not very distinct, covering 1/3–1/2 of sporocarp base; *inferior tooth* absent (or present as shallow hump); *superior tooth* not very conspicuous, rather short, broadly conical, obtuse; *sori* 8–12. Fig. 16: 8.

South West Africa/Namibia, Botswana, northern Cape Province and central Transvaal. Map 49.

Vouchers: *Galpin* M74 (PRE); *Giffen* s.n. (BM).

14. *Marsilea vera* Launert in Mitt. Bot. StSamml., Münch. 3: 505 (1960); in Senckenberg. biol. 49: 308, t. 60–62 (1968); in F.S.W.A. 11: 4 (1969); in F.Z. Pterid.: 65, t. 18A (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 486, t. 366 (1983). Type: South West Africa/Namibia, Olukonda, *Schin* s.n. (B, holo.).

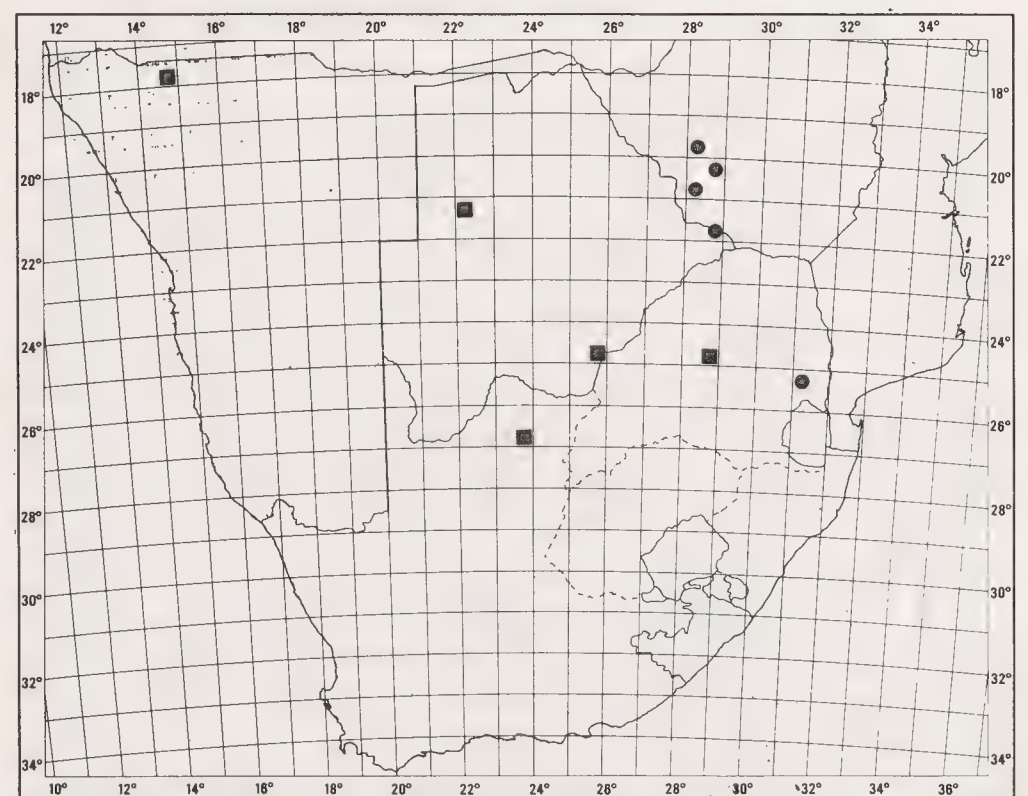
Stipes slender, somewhat glabrous, c. 40–200 mm long. *Pinnae* very densely greyish villous when young, flanks straight or slightly convex, outer margin entire, retuse, bilobed, crenate, irregularly dentate, or rarely deeply bifurcate. *Pedicels* usually downward-growing, burying sporocarp in the soil, rarely spreading, usually glabrous, c. 4–10 mm long. *Sporocarps* always distinctly pedicelled, deflexed against pedicel, subrectangular to obliquely broad-elliptic in lateral view, elliptic to obtusely rectangular in dorsiventral cross-section, not bordered at maturity, usually without furrow; *lateral ribs* 8–10, not easily visible at maturity; *veins* (seen interiorly) not anastomosing; *raphe*

distinct, usually attached to entire sporocarp base; *inferior tooth* absent; *superior tooth* very short, broadly conical, always obtuse, dark brown; *sori* c. 6–8. Fig. 16: 6.

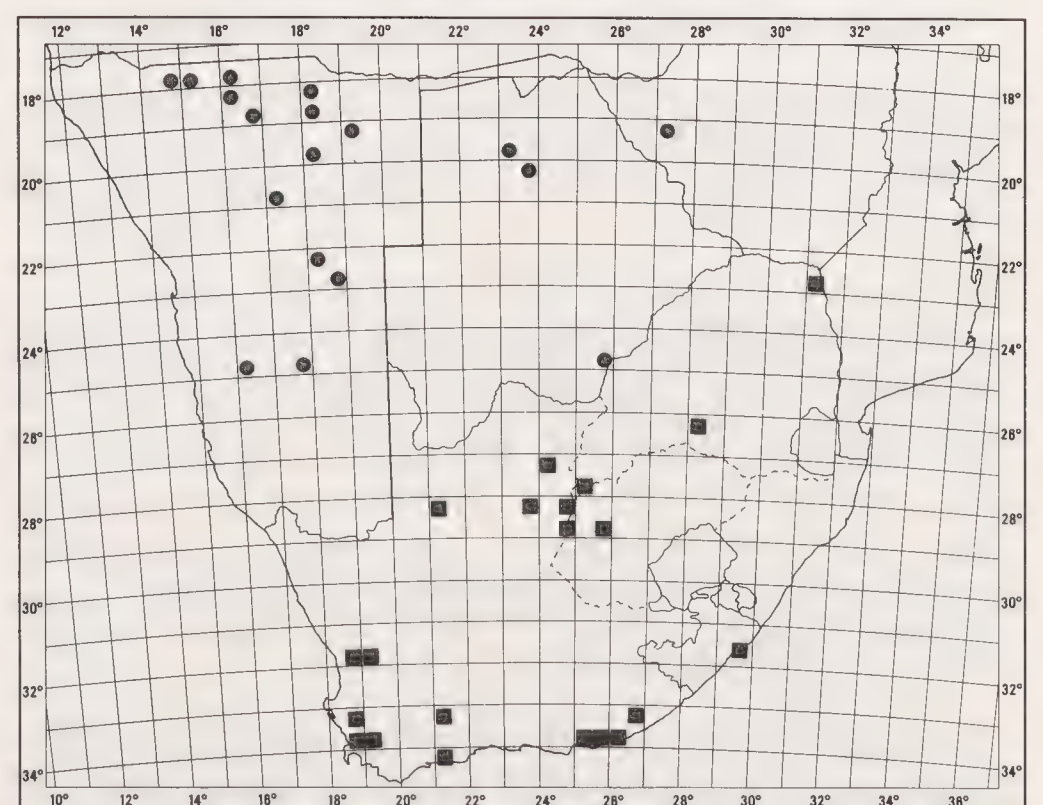
South West Africa/Namibia, Botswana and Zimbabwe. Map 50.

Vouchers: *Gibbs Russell & Biegel* 1378 (BOL; SRGH); *Schweickerdt* 2179 (BM; BOL; K; M; NU; PRE; WIND); 2200 (BM; BOL; K; M; NU; PRE; PRU; WIND); *Van Jaarsveld* 2956 (NBG).

15. *Marsilea capensis* A.Br. in Mber. K. preuss. Akad. Wiss. Berl. 1863: 428 (1864); Launert in Senckenberg. biol. 49: 310, t. 63–64, 76 (1968); in F.Z. Pterid.: 66, t. 18D (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 487, t. 367 (1983). Type: Cape Province, *Drège* s.n. (B, lecto.).

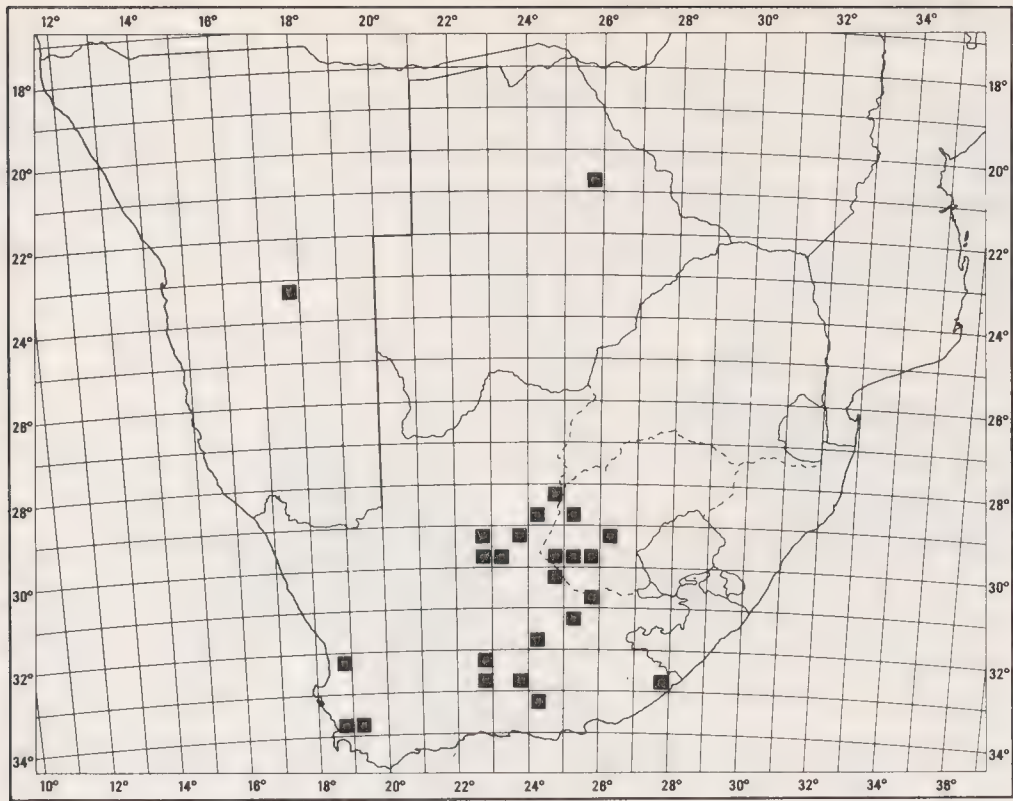


MAP 49.—● *Marsilea apposita*  
■ *Marsilea villifolia*



MAP 50.—● *Marsilea vera*  
■ *Marsilea capensis*



MAP 51.—*Marsilea burchellii*

Stipes slender, flexible, usually crowded, c. 70–200 mm long. *Pinnae* narrowly obdeltate to obdeltate-obovate, flanks slightly convex. *Pedicels* solitary, free, slender, erect or ascending, c. 4–7 mm long. *Sporocarps* obliquely broad-oblong or irregularly rhombic (rarely rectangular or square) in lateral view, often typically axe-shaped, distally obliquely truncate or more rarely rounded, narrowly elliptic in dorsiventral cross-section, always unbordered, laterally compressed or slightly inflated only, dark brown to almost black at maturity; *lateral ribs* always absent; *lateral veins* (seen interiorly) not anastomosing; *raphe* distinct, covering  $\frac{4}{5}$  to entire sporocarp base; *inferior tooth* absent (or very rarely present as very shallow hump); *superior tooth* distinct, short, conical, acute or subacute, rarely obtuse, erect or somewhat recurved; *sori* c. 8–10.

Widespread in Cape Province; Transkei, Orange Free State, Transvaal, Zambia and Egypt. Map 50.

Vouchers: *Grobbelaar* 2042 (PRU); *Leistner* 1427 (BM; BOL; PRE); *Oliver* 4404 (STE); *Schlechter* 10909 (BOL; GRA; P).

16. *Marsilea burchellii* (Kunze) A. Br. in Mber. K. preuss. Akad. Wiss. Berl. 1863: 429 (1864); Launert in Senckenberg. biol. 49: 311, t. 65–66, 77 (1968); in F.S.W.A. 11: 3 (1969); in F.Z. Pterid.: 66, t. 18C (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 488, t. 368 (1983). Type: Cape Province, Asbestos Mountains, *Burchell* 1625 (B, holo.; K!).

*Marsilea quadrifolia* var. *burchellii* Kunze in Linnaea 10: 556 (1836). *Zalusianskya burchellii* (Kunze) Kuntze, Rev. Gen. 2: 823 (1891). *Marsilea macrocarpa* var. *burchellii* (Kunze) Sim, as (A. Br.) Sim, Ferns S. Afr. edn 2: 315, t. 172 fig. 2 (1915).

*Marsilea biloba* Willd. in L., Sp. Pl. edn 4, 5: 540 (1810). *Marsilea macrocarpa* var. *biloba* (Willd.) Sim, Ferns S. Afr. edn 2: 315, t. 172 fig. 3 (1915). Type: Cape Province, near Mossel Bay, *Meuron* s.n., Herb. Willdenow no. 20257 (B, holo.!).

Stipes rather slender, usually glabrous, c. 5–60 mm long (rarely longer). *Pinnae* variable, flanks straight or slightly convex. *Pedicels* always free, rather slender, flexible, erect or ascending, pilose at first, c. 3–8 mm long. *Sporocarps* usually crowded, very small, c.  $1,25 \times 2,5 \times 1,5$ – $2 \times 0,6$ – $1,5$  mm thick, subcircular, pyriform, very rarely obtusely square or slightly rectangular in lateral view, dorsiventral cross-section varying from circular to elliptic, never bordered, densely set with appressed or spreading hairs (all downward-pointing) when young; *lateral ribs* not apparent at maturity; *raphe* present, not very distinct, covering  $\frac{1}{3}$ – $\frac{1}{2}$  of sporocarp base; *inferior tooth* completely absent; *superior tooth* always developed, conical, short and obtuse or long (up to 0,3 mm) and acute; sporangia c. 3–5. Fig. 16: 3.

South West Africa/Namibia, Botswana, Cape Province and Orange Free State. Map 51.

Vouchers: *Acocks* 8797 (BOL; PRE); *Comins* 820 (BOL; PRE); *Leippert* 4687 (M; WIND); *Schelppe* 4552 (B, BM; BOL; GH; K; M; MO; PRE; S; US); *Verdoorn* 1320 (K; PRE).

## SALVINIACEAE

Floating aquatic plants with slender branched siphonostelic rootless rhizomes. *Leaves* dimorphous, borne in whorls of 3, 2 leaves floating, oblong to orbicular, entire, variously papillate on aerial surface, the third leaf submerged, finely dissected, hairy and root-like. *Sori* in thin-walled sporocarps borne on dissected submerged leaf; *sporangia* borne on branched receptacles. *Microspores* germinating within microsporangium.



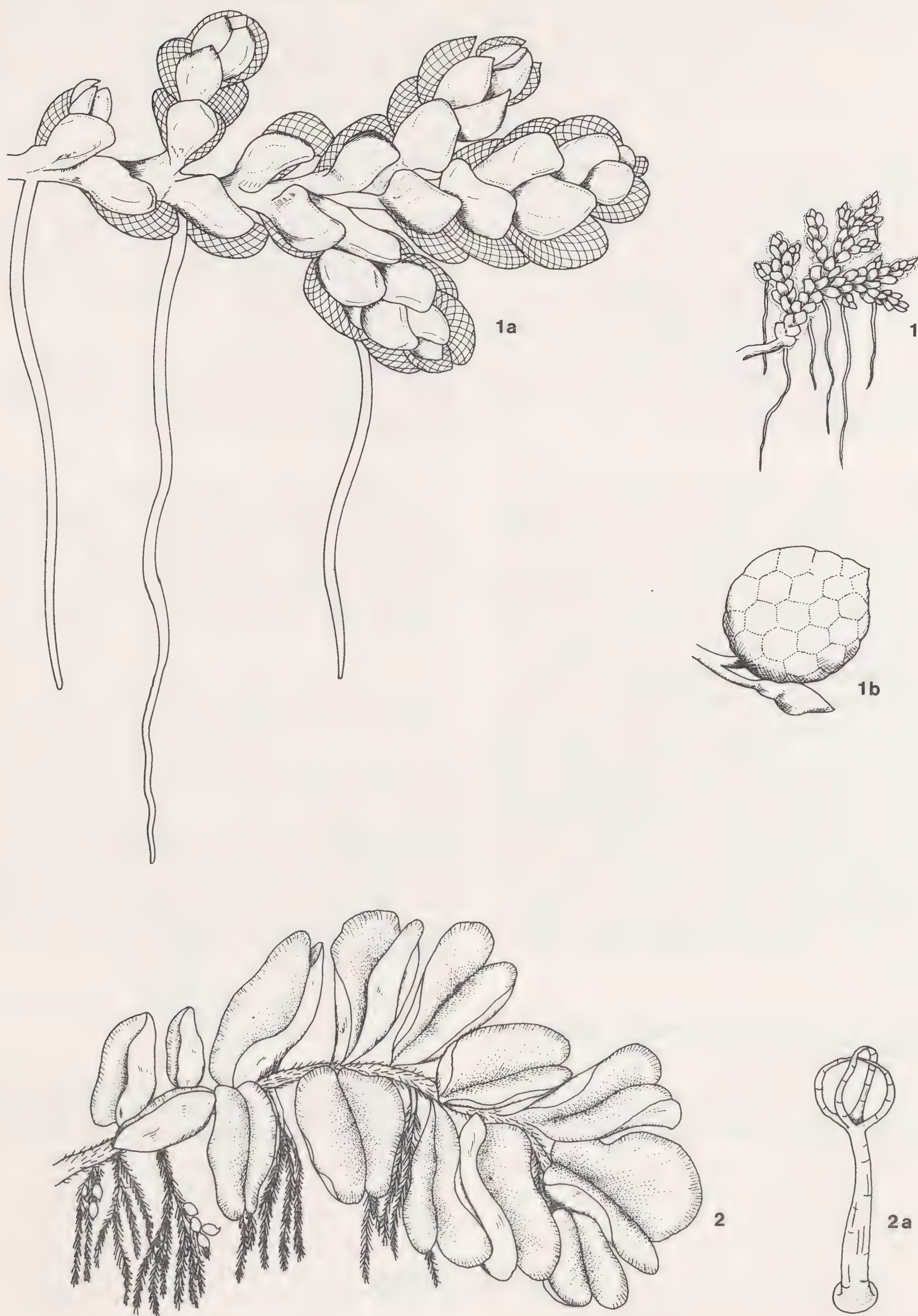


FIG. 17.—1, *Azolla filiculoides*, part of plant,  $\times 3$ ; 1a, terminal branch,  $\times 9$ ; 1b, megasporocarp and microsporocarp,  $\times 30$  (from live material). 2, *Salvinia molesta*, habit,  $\times 2$ ; 2a, papilla from upper surface of floating frond,  $\times 20$  (from live material).



## SALVINIA

**Salvinia** Séguier, Fl. Veron. 3: 52 (1754); Engl., Pflanzenw. Afr. 2: 67 (1908); Tardieu-Blot in Fl. Madag. 11: 1 (1952); in Mém. Inst. fr. Afr. noire 50: 17 (1957); Alston in F.W.T.A. edn 2, Suppl. 25 (1959); Tardieu-Blot in Fl. Gabon 8: 39 (1964); in Fl. Camer. 3: 55 (1964); Schelpe in F.Z. Pterid.: 67 (1970). Type species: *S. natans* (L.) Allioni (= *Marsilea natans* L.).

## Description as for family.

The only genus of the family, comprising about 10 species, mostly in tropical America, but with one indigenous species in continental Africa and one introduced species, the latter occurring in our area.

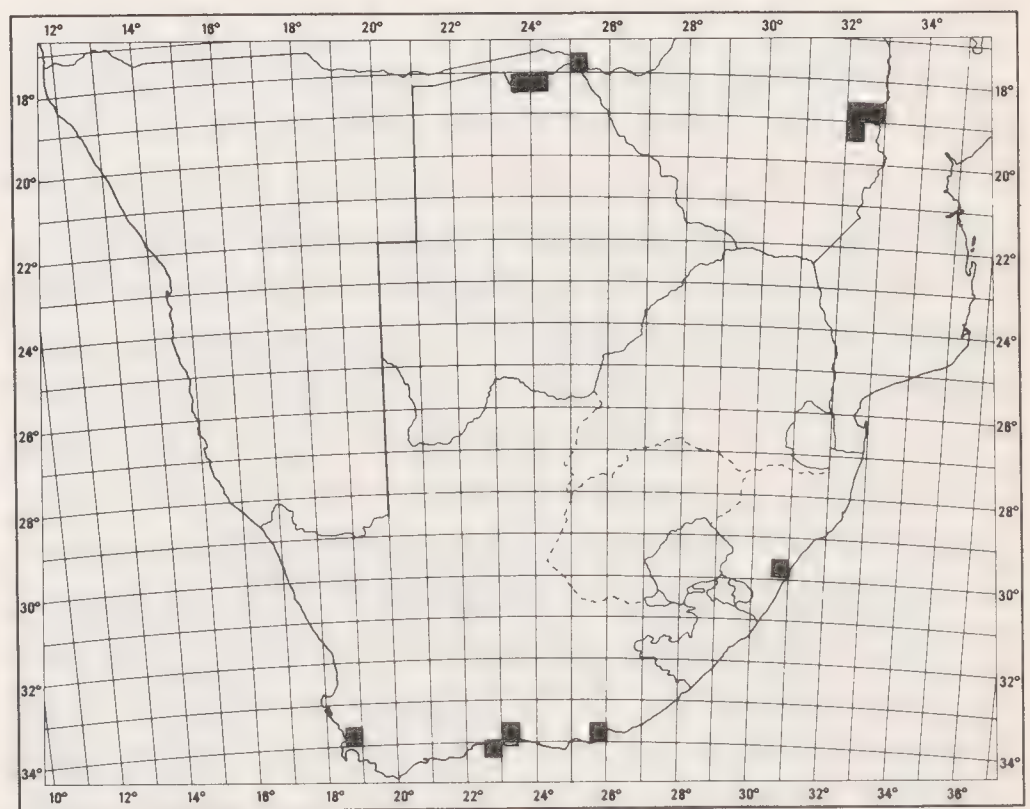
**Salvinia molesta** D. S. Mitchell in Fern Gaz. 10: 251 (1972); Jacot Guillarmod in East. Cape Natur. 62 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 490, t. 28, 369 (1983). Type: Zimbabwe, Lake Kariba, Ruziruhuru River Inlet, Mitchell 1330 (SRGH, holo.; B; BM; BO; BOL!; BR; CAL; CHR; EA; GE; GH; K; LISB; LO; M; MO; NSW; P; PDA; PRE; RH; US; WAG; Z).

*Salvinia auriculata* sensu Schelpe in F.Z. Pterid.: 67, t. 19B (1970).

Rhizome horizontal, up to 1,2 mm in diameter, set on the under surface with brown multicellular hairs up to 2 mm long. *Floating fronds* in pairs, emarginate, base cordate, flat in weak specimens, folded along midrib in vigorous specimens, up to 25 × 24 mm; upper surface with dense multicellular papillae c. 2 mm high, with 4 separate curved segments adjoining apically to form an open basket structure; under surface thinly beset with pale multicellular hairs up to 1 mm long. *Submerged fronds* much dissected, up to 120 mm long, lobes with dense brown multicellular hairs up to 2 mm long. *Sporocarps* spherical, hairy, up to 33 arranged in rows along one lobe of dissected submerged frond. Fig. 17: 2.

A putative sterile hybrid possibly introduced from tropical America and subsequently spreading through central Africa: Kenya, Zambia, Mozambique, Zimbabwe, Botswana and Southern Africa, as well as Ceylon, Indonesia and Australia. Standing, inland waters. Map 52.

Vouchers: Gibbs Russell & Biegel 1341 (BOL; SRGH); Mitchell 190 (BOL; SRGH); Oliver 651 (PEU); Smith 1165 (BOL; GAB; SRGH); Van Schoor s.n. (STE).



MAP 52.—*Salvinia molesta*

## AZOLLACEAE

Floating aquatic plants with slender pinnately branched siphonostelic rhizomes and with roots borne singly or in fascicles. *Leaves* alternate, imbricate, 2-lobed, with an aerial chlorophyllous lobe and a thin colourless submerged lobe. *Sori* in thin-walled sporocarps borne on the basal leaf of a branch, heterosporous; *megasporocarp* with a single megaspore surmounted by apical massulae; *microsporocarp* with numerous microsporangia, microspores germinating in a massula derived from microsporangial contents. *Female gametophyte* submerged.

## AZOLLA

**Azolla** Lam., in Encycl. Méth. Bot. 1: 343 (1783); Engl., Pflanzenw. Afr. 2: 67 (1908); Tardieu-Blot in Fl. Madag. 11: 2 (1952); in Mém. Inst. fr. Afr. noire 50: 19 (1957); Alston in F.W.T.A. edn 2, Suppl. 27 (1959); Tardieu-Blot in Fl. Gabon 8: 41 (1964); in Fl. Camer. 3: 55 (1964); Launert in F.S.W.A. 12: 1 (1969); Schelpe in F.Z. Pterid.: 69 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 36 (1973); in C.F.A. Pterid.: 57 (1977). Type species: *A. filiculoides* Lam.



### Description as for family.

The only genus of the family, comprising 5 species, 2 of which are indigenous to continental Africa, one of them to our area. Another has been introduced and is spreading as a weed on dams.

Megaspores surmounted by 3 massulae; massulae of microspores armed all round with rigid glochidia with anchor-shaped tips ..... 2. *A. filiculoides*

Megaspores surmounted by numerous massulae; massulae of microspores with few or no outgrowths ..... 1. *A. pinnata*

1. ***Azolla pinnata* R. Br.**, Prodr. Fl. Nov. Holl. 167 (1810); Sim, Ferns S. Afr. edn 2: 312, t. 172 fig. 1 (1915); Schelpe in C.F.A. Pterid.: 57 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 493, t. 371 (1983) Type: Australia, near Port Jackson, *Brown* s.n. (BM, holo.—BOL, photo.).

*Azolla africana* Desv. in Mém. Soc. Linn., Paris 6, 2: 178 (1827). *Azolla pinnata* var. *africana* (Desv.) Bak., Fern Allies 138 (1887); Schelpe in Contr. Bolus Herb. 1: 14 (1969); in F.Z. Pterid.: 69 (1970). Type: Senegal, *Desvaux* s.n., Herb. Lavallée (P, holo.).

Rhizome horizontal, minutely papillate, up to 20 × 0,2 mm; *roots* in fascicles of 2–3, hairy, up to 35 mm long with long conspicuous root-cap. *Upper leaf lobe* ovate to broadly elliptic, up to 1,1 mm long, papillate chlorophyllous central portion surrounded by hyaline border; *lower leaf lobe* similar in size but hyaline. *Megasporocarps* with prominent dark apex and containing a single granular megaspore surmounted by numerous massulae. *Microsporocarps* borne singly or subtended by a megasporocarp, only partly covered by a hyaline lower leaflet, spherical, with minute dark apex and containing numerous long-stalked microsporangia; *massulae* with few or no weak outgrowths.

Widespread in tropical Africa as far south as South West Africa/Namibia, Botswana and Natal. Pools and backwaters of rivers, between 3 and 50 m altitude. Map 53.

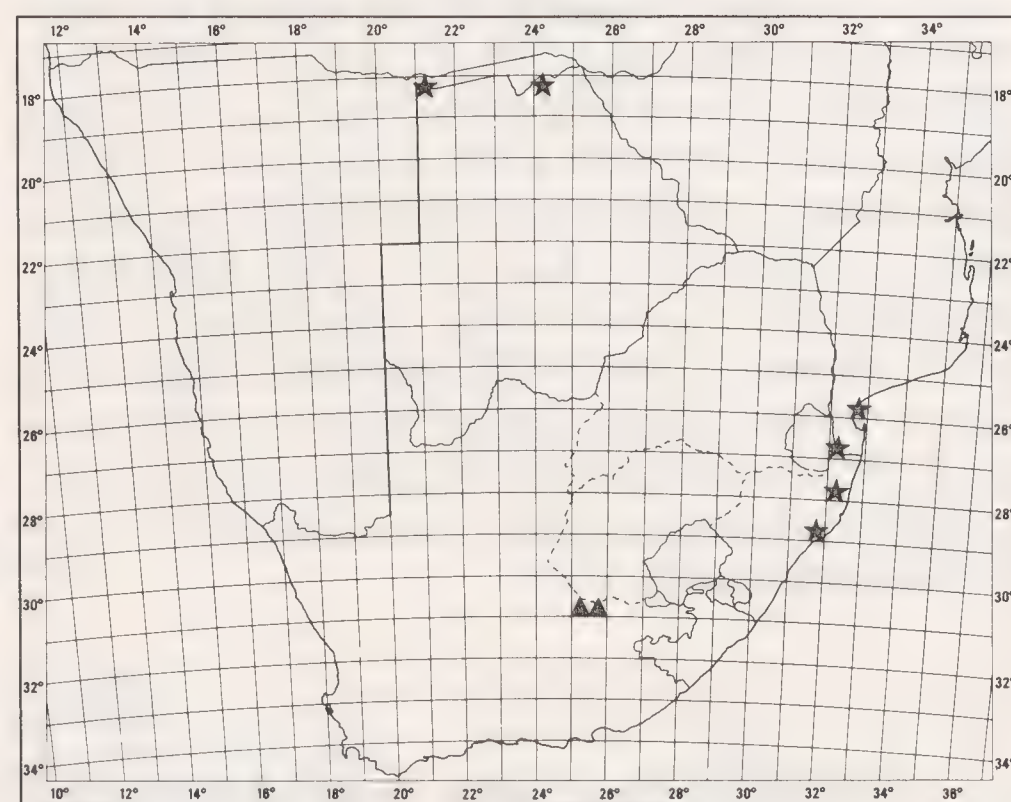
Vouchers: *Wager* s.n. (BM; BOL.); *Ward* 2473 (BM; NPB; NU).

2. ***Azolla filiculoides* Lam.**, Encycl. 1: 343 (1783); Jacot Guillarmod in East. Cape Natur. 63 (1978); W. B. G. Jacobsen, Ferns Sthn Afr. 494, t. 373 (1983). Type: South America, Tierra del Fuego, Straits of Magellan, *Commer-son* s.n. (P, holo.).

Very closely related to *Azolla pinnata* from which it differs as follows: Roots borne singly. *Megaspores* surmounted by 3 massulae. *Microspore massulae* armed all round with rigid glochidia with anchor-shaped tips. Fig. 17: 1.

Orange Free State and Cape Province, especially along the Orange River. In artificial dams and reservoirs, c. 1 000 m. (See also Ashton & Walmsley, 1976). Map 53.

Vouchers: *Ashton* 1311 (BOL; PRE); *Edwards* 4198 (BOL)



MAP 53.—★ *Azolla pinnata*  
▲ *Azolla filiculoides*

## CYATHEACEAE

Arborescent plants with an erect caudex (trunk) made up of a dictyostelic axis enveloped by numerous short adventitious roots and old stipe bases; scales produced apically and on stipe bases. *Fronds* usually large, borne at apex of caudex, deeply 2-pinnatifid to 3-pinnate or 4-pinnatifid, membranous to coriaceous, under surface glabrous to villous or tomentose; *veins* free. *Sori* superficial on veins; *receptacle* elongated or hemispherical; sporangia developing mostly in basipetal succession, short-stalked, dehiscing horizontally; *annulus* complete, oblique; *indusium* basal, cup-shaped, 1-sided or absent. *Gametophyte* thick, cordate.



## CYATHEA

**Cyathea** J. E. Sm. in *Memorie Accad. Sci. Torino* 5: 416 (1793); Engl., *Pflanzenw. Afr.* 2: 7 (1908); Tardieu-Blot in *Fl. Madag.* 4: 2 (1951); Alston in *Mém. Inst. fr. Afr. noire* 28: 49 (1953); Tardieu-Blot in *Fl. Gabon* 8: 50 (1964); in *Fl. Camer.* 3: 65 (1964); Schelpe in *F. Z. Pterid.*: 70 (1970); in *Expl. Hydrobiol. Bassin L. Bangw. & Luapula* 8,3 *Pterid.*: 13 (1973); Holttum in *Kew Bull.* 36: 463–482 (1981). Lectotype species: *C. arborea* (L.) J.E. Sm. (= *Polypodium arboreum* L.).

*Alsophila* R. Br., *Prodr. Fl. Nov. Holl.* 158 (1810).

*Hemitelia* R. Br., loc. cit. (1810).

## Description as for family.

A genus of over 800 species throughout the tropics and the southern temperate regions. Species with asymmetric indusia were previously referred to the genus *Hemitelia*.

Aphlebia (basal pinnae with filiform segments) absent; ultimate pinnule segments entire to subentire and set with hair-like costal scales below ..... 1. *C. dregei*  
Aphlebia present; ultimate pinnule segments sharply dentate and set with pale bullate costal scales below ..... 2. *C. capensis*

1. ***Cyathea dregei* Kunze** in *Linnaea* 10: 551 (1836); Sim, *Ferns S. Afr.* edn 2: 82, t. 6 (1915); Schelpe in *F.Z. Pterid.*: 74, t. 21E (1970). Type: Transkei, between the Umzimvubu and Umsicaba Rivers, *Drège* s.n. (LZ, holo.†; BM!; K!; L-BOL, photo.†; P!).

*Alsophila dregei* (Kunze) Tryon in *Contr. Gray Herb. Harv.* 200: 30 (1970); Schelpe in *C.F.A. Pterid.*: 60 (1977); W. B. G. Jacobsen, *Ferns Sthn Afr.* 201, t. 21, 29, 141 (1983).

*Cyathea burkei* Hook., *Sp. Fil.* 1: 23, t. 17B (1844). Type: Transvaal, Magaliesberg, *Burke* 150 (K, holo.†; BM!).

Caudex stout, up to 0,45 m in diameter and 5 m tall. *Fronde*s arching, thinly to thickly coriaceous; *stipe* brown, variously tuberculate, c. 0,15 m long, set with numerous subulate, castaneous, minutely lacerate scales up to 53 mm long around *stipe* base; *lamina* 3-pinnate, elliptic in outline, up to 3 × 0,7 m, lowest pinnae reduced; *pinnae* narrowly oblong, acute, up to 0,56 × 0,19 m, pinnate into linear to very narrowly oblong, acute to attenuate, pinnate pinnules; *pinnule lobes* very narrowly oblong, somewhat falcate, acute, subentire to crenate, upper surface glabrous, under surface subglabrous to densely tomentose; *rhachis* pale brown, smooth. *Sori* up to 12 per pinnule lobe, c. 1 mm in diameter; *indusium* shallowly to deeply cupuliform. Fig. 18.

Cape Province, Transkei, Natal, Lesotho, Swaziland, Transvaal, Zimbabwe and Mozambique. Streambanks in grassland and on forest margins, 900–1 800 m. Map 54.

Vouchers: *Baur* 161 (GRA; K; SAM); *Fisher* 878 (NH; NU; PRE); *McLea* s.n. (BOL; GRA; K; SAM); *Rudatis* 790 (BM; K; PRE); *Schlechter* 4460 (BM; BOL; K; PRE).

Specimens from north of our area often have smaller indusia than the typical Southern African and other forms.

The juvenile foliage of *C. dregei* resembles the mature foliage of *C. capensis* (L.f.) J.E. Sm. in that the ultimate segments are conspicuously dentate.

2. ***Cyathea capensis* (L. f.) J.E. Sm.** in *Mém. Acad. Turin* 5: 417 (1793); Schelpe in *F.Z. Pterid.*: 74, t. 21D (1970). Type: Cape of Good Hope, *Sparrmann* s.n. (LINN 1251/61, holo.!).

*Polypodium capense* L. f., *Suppl.* 445 (1781). *Aspidium capense* (L. f.) Swartz in *J. Bot., Gött.* 1800, 2: 42 (1801). *Hemitelia capensis* (L. f.) Kaulf., *Enum. Fil.* 253 (1824); Sim, *Ferns S. Afr.* edn 2: 85, t. 7 (1915). *Alsophila capensis* (L. f.) J. Sm. in *J. Bot., Lond.* 1: 666 (1842); W. B. G. Jacobsen, *Ferns Sthn Afr.* 202, t. 142 (1983). *Polystichum capense* (L. f.) J. Sm. in *Bot. Mag.* 72, *Compend.* 35 (1846). *Cormophyllum capense* (L. f.) Newm. in *Phytologist* 5: 238 (1854). *Amphicosmia capensis* (L. f.) Klotzsch in *Allg. Gartenzeit.* 1856: 107 (1856).

*Trichomanes incisum* Thunb., *Prodr.* 173 (1800). Type: Cape Province, Grootvadersbosch, *Thunberg* s.n. (UPS, holo.!).

*Cyathea riparia* Willd. in *L., Sp. Pl.* edn 4, 5: 493 (1810). *Hemitelia riparia* (Willd.) Desv. in *Mém. Soc. Linn., Paris* 6: 322 (1827). *Amphicosmia riparia* (Willd.) Gardn. in *J. Bot., Lond.* 1: 441, t. 12 (1842). Type: Cape Province, *Meuron* s.n., *Herb. Willdenow* No. 20172 (B, holo.!).

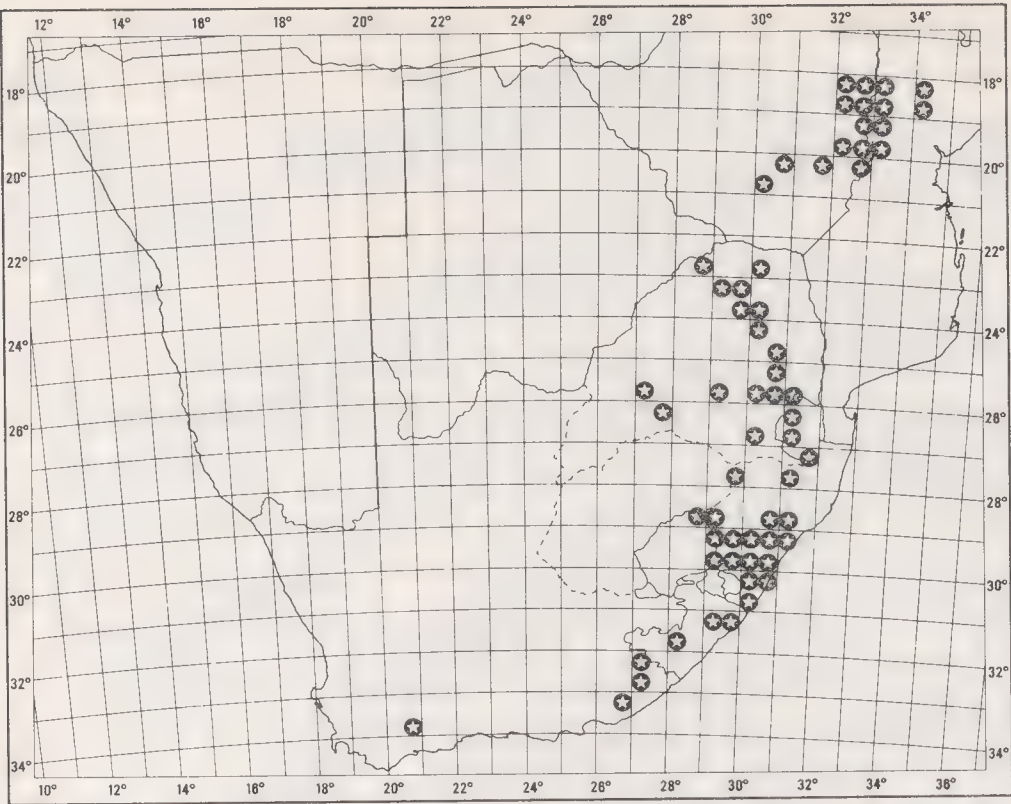
*Trichomanes cormophyllum* Kaulf., *Enum. Fil.* 266 (1824). Type: Cape of Good Hope.





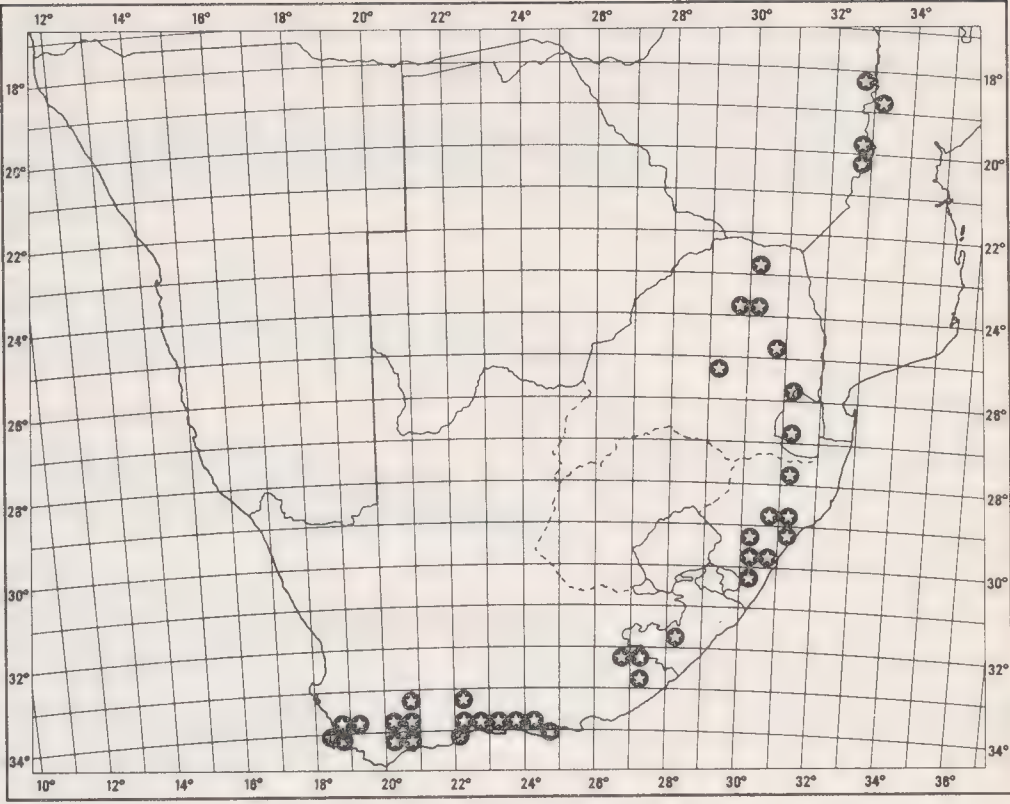
FIG. 18.—1, *Cyathea dregei*, pinna,  $\times 0,6$ ; 1a, stipe base,  $\times 0,6$  (Schelpe 6263).





MAP 54.—*Cyathea dregei*

Caudex slender, c. 0,1 m in diameter and up to 4,5 m high. *Fronds* arching, herbaceous; *stipe* pale brown ventrally, dark purplish brown dorsally, sparsely set when young with narrowly lanceolate, castaneous scales c. 10 mm long with paler lacerate margins; *lamina* elliptic, deeply 3-pinnatifid, up to 2 × 0,8 m; *pinnae* oblong, attenuate, up to 0,46 × 0,16 m, pinnate into very narrowly oblong, attenuate, deeply pinnatifid pinnules; *pinnule segments* dentate, narrowly oblong, somewhat falcate, acute, upper surface glabrous, under surface set with pale bullate scales along costules; *rhachis*



MAP 55.—*Cyathea capensis*

pale to dark brown, smooth, glabrous. *Sori* 1–2 at base of each pinnule segment, c. 1 mm in diameter, with paraphyses; *indusium* asymmetric. Fig. 19.

South-western Cape Province to Transkei, Natal, Swaziland, Transvaal, Zimbabwe, Mozambique, Malawi and Tanzania. Also Brazil (Holttum, 1981). Shaded, moist, forested ravines, 1 370–1 800 m. Map 55.

Vouchers: *Cooper* 1417 (BM; K; NH; PRE); *Enslin & Schweickerdt* s.n. (BM; NU; PRU; STE); *Fisher* 792 (NH; NU; PRE); *Schelpe* 4374 (BM; BOL); *Thode* A63 (K; NH; PRE).

HYMENOPHYLLACEAE

Small delicate epiphytic or terrestrial herbs with slender, creeping or erect, protostelic rhizomes. *Fronds* simple or variously divided; lamina 1 cell thick, without stomata; *veins* free or joining a submarginal vein; *false veins*, unconnected with vascular system of lamina, sometimes present. *Sori* marginal with sporangia borne in basipetal succession on an elongated receptacle within a tubular, obconic or bivalved indusium; *annulus* complete, oblique. *Prothallus* filamentous or thalloid and narrow.

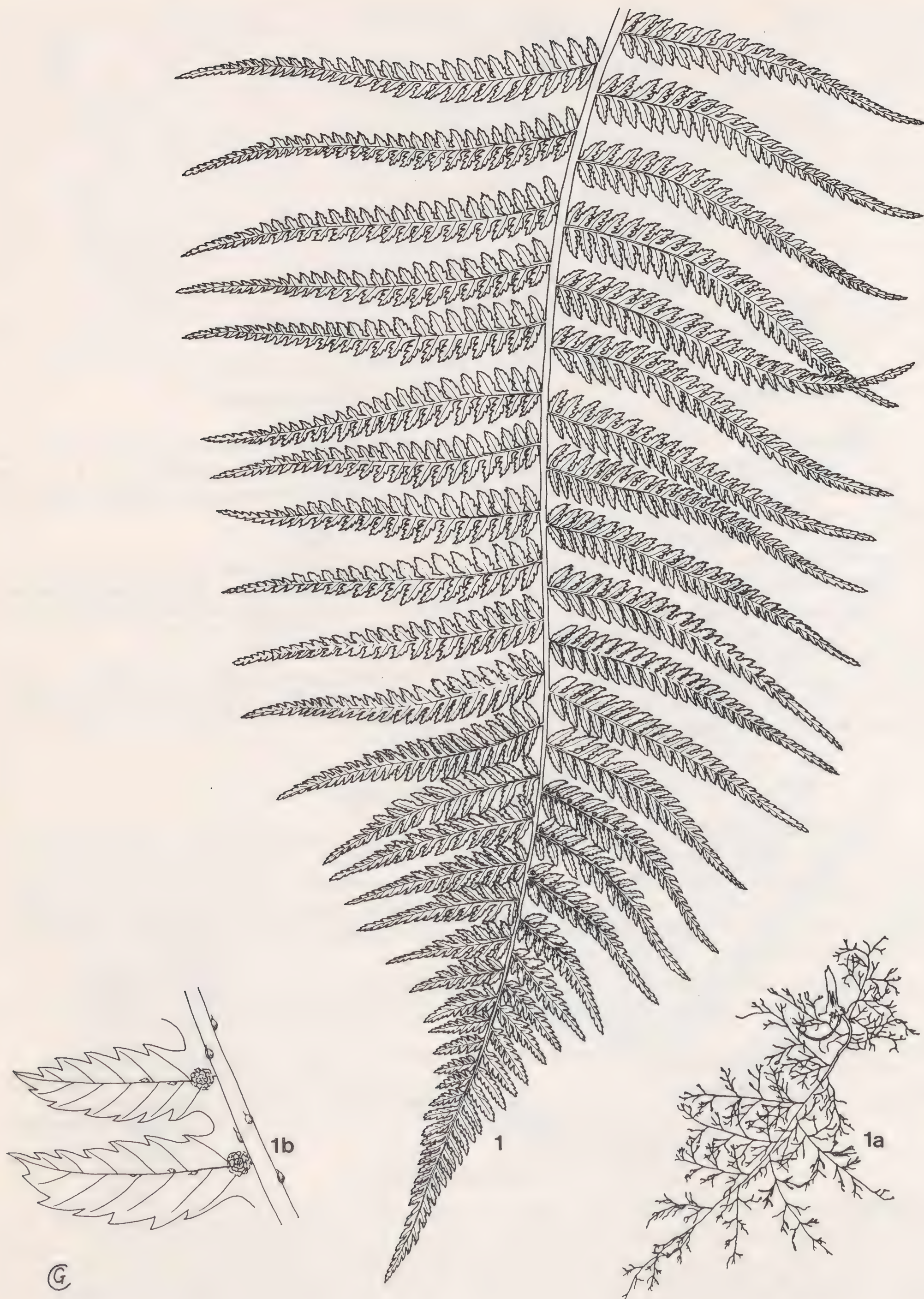
Copeland (1938, 1947) divided the Hymenophyllaceae into 33 genera, most of which present-day authors prefer to treat as subgenera of *Hymenophyllum* and *Trichomanes* (Crabbe *et al.*, 1975; Tryon & Tryon, 1982).

- Indusium tubular to obconic with 2 small lobes at apex; receptacle often elongated beyond sorus; rhizome usually thickly set with black or brown hairs ..... 1. *Trichomanes*
- Indusium of 2 separate valves, sometimes with a small obconic base; receptacle shorter than valves; rhizome subglabrous ..... 2. *Hymenophyllum*

1. TRICHOMANES

*Trichomanes* L., Sp. Pl. 1097 (1753); Gen. Pl. edn 5: 485 (1754); Engl., Pflanzenw. Afr. 2: 3 (1908); Tardieu-Blot in Fl. Madag. 3: 16 (1951); in Mém. Inst. fr. Afr. noire 28: 39 (1953); Alston in F.W.T.A. edn 2, Suppl. 29 (1959); Tardieu-Blot in Fl. Gabon. 8: 58 (1964); in Fl. Camer. 3: 77 (1964); Schelpe in F.Z. Pterid.: 75 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 40 (1973); in C.F.A. Pterid.: 62 (1977). Lectotype species: *T. crispum* L.







Rhizome filiform, widely creeping or erect, densely set with black or brown hairs, or shorter and thicker (1–3 mm thick). *Fronds* simple, or up to 4-pinnatifid, glabrous or subglabrous or with marginal hairs; *veins* free or connected to a submarginal vein; *false veins* sometimes present. *Sori* marginal, turbinate to obconic, with 2 rounded apical lobes; filamentous receptacle often exerted beyond sorus.

A genus composed of more than 250 species, chiefly tropical, worldwide.

1a Fronds simple or lobed less than halfway to midrib:

2a Marginal vein absent; margin of young fronds with stiff brown hairs ..... 1. *T. reptans*

2b Marginal vein present; frond margin without hairs ..... 2. *T. erosum* var. *aerugineum*

1b Fronds 2-pinnatifid to 4-pinnatifid:

3a Rhizome stout, 2–3 mm in diameter; fronds 3- to 4-pinnatifid ..... 3. *T. rigidum*

3b Rhizome filiform; fronds 2- to 3-pinnatifid:

4a Rhizome set with black hairs; sorus conical, almost as deep as broad ..... 4. *T. pyxidiferum* var. *melanotrichum*

4b Rhizome set with brown hairs; sorus turbinate, about twice as deep as broad ..... 5. *T. borbonicum*

**1. *Trichomanes reptans* Swartz, Prodr. Veg. Ind. Occ. 136 (1788); W. B. G. Jacobsen, Ferns Sthn Afr. 186, t. 126 (1983). Type: Jamaica (?S, holo.; BM, iso.).**

*Trichomanes robinsonii* Hook. ex Bak. in J. Linn. Soc., Bot. 9: 339, t. 8B (1867). *Didymoglossum robinsonii* (Hook. ex Bak.) Copel. in Philipp. J. Sci. 67: 77, t. 31 figs 7, 8 (1938). Syntypes: Natal, Robinson s.n. (K!); Sander-son s.n. (K!).

*Trichomanes montanum* sensu Sim, Ferns S. Afr. edn 2: 71, t. 2 fig. 1 (1915).

Rhizome set with dark brown hairs. *Fronds* borne 3–10 mm apart; *stipe* very short, set with dark brown hairs; *lamina* ovate to oblong, up to 30 × 13 mm, pinnatifid, groups of dark brown hairs borne at intervals along margins of young fronds; submarginal vein absent. *Sori* borne at apices of fronds, turbinate, c. 3

mm deep × 1 mm in diameter, only winged by lamina basally, valves entire, rounded. Fig. 20: 11.

Transkei, Natal and Transvaal, as well as Madagascar and South America. A lithophyte or low-level epiphyte from sea level to 1 500 m. Map 56.

Vouchers: Enslin & Schweickerdt s.n. (NU; PRU; STE); Fisher 856 (BM; BOL; NH; NU; PRU); Schelpe 1699 (BOL; NH; NU); 5043 (B; BM; BOL; GH; K; M; P; PRE; S; US).

**2. *Trichomanes erosum* Willd. in L., Sp. Pl. edn 4, 5: 501 (1810); Schelpe in F.Z. Pterid.: 76, t. 22B (1970); in C.F.A. Pterid.: 62 (1977). Type: West Africa, Oware and Benin, Flugge s.n., Herb. Willdenow no. 20189 (B, holo.).**

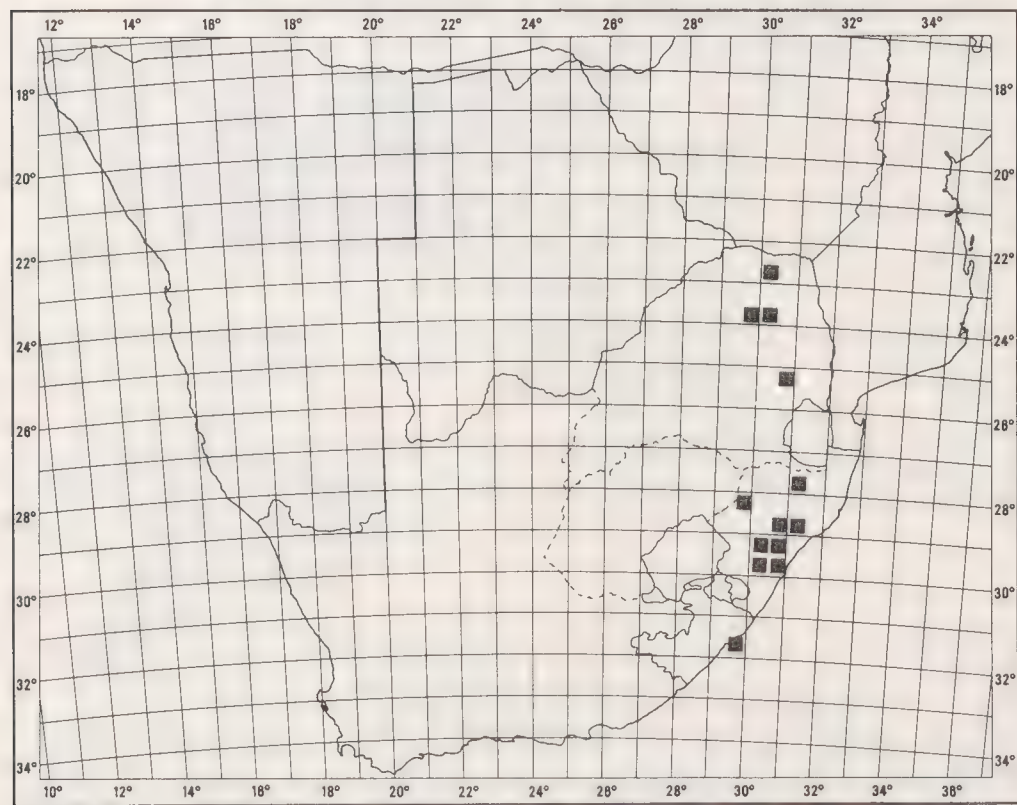
The typical variety does not occur in Southern Africa.

**Var. *aerugineum* (Van den Bosch) Bonap., Not. Pterid.: 13: 165 (1929); Schelpe in F.Z. Pterid.: 76 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 188, t. 127 (1983). Type: Fernando Po, Barter s.n., Herb. Hooker (K, holo.).**

*Trichomanes aerugineum* Van den Bosch in Ned. Kruid. Archf., ser. 1, 5, 3: 201 (1863).

*Trichomanes erosum* sensu Sim, Ferns S. Afr. edn 2: 72, t. 2 fig. 3 (1915).

Rhizome set with dark brown hairs. *Fronds* borne 0.5–1 mm apart; *stipe* short, bearing dark brown hairs when young; *lamina* linear to ovate-oblong, variously pinnatifid, up to 20

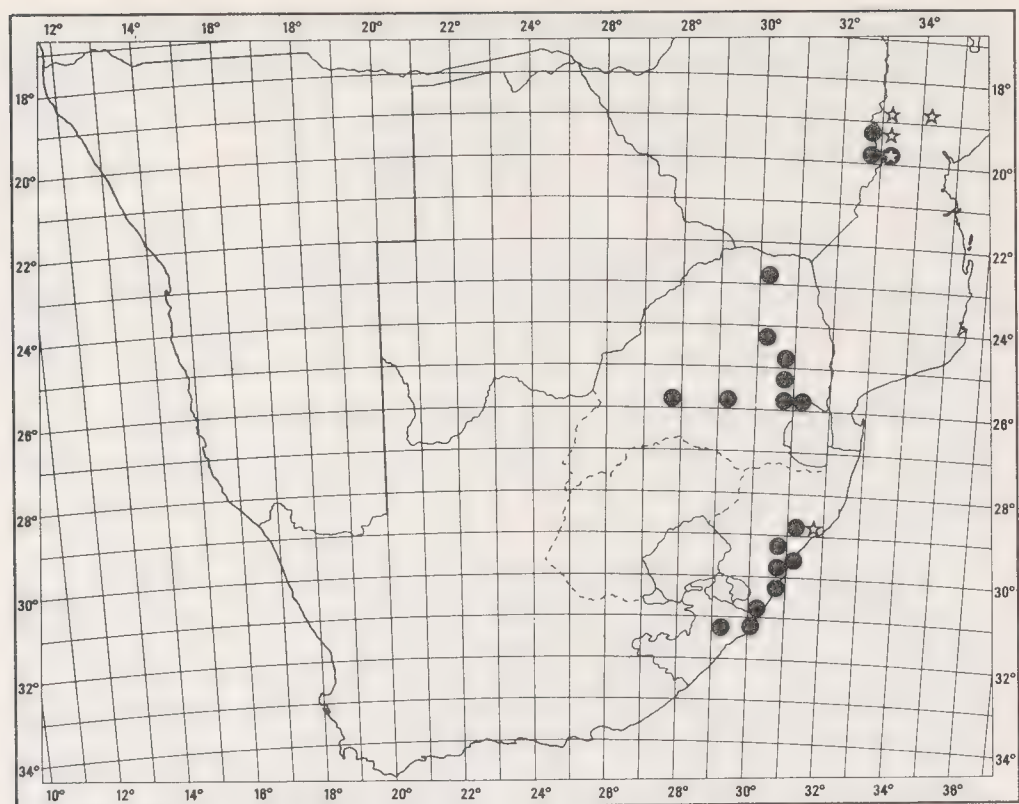


MAP 56.—*Trichomanes reptans*









MAP 57.—☆ *Trichomanes erosum* var. *aerugineum*  
● *Trichomanes rigidum*  
★ *Trichomanes erosum* and *Trichomanes rigidum*

× 10 mm, with occasional brown hairs on costae of young fronds; submarginal vein present. *Sori* borne in upper half of frond, c. 1 mm deep and 0,4 mm in diameter, with rounded entire valves and winged by lamina throughout its length. Fig. 20: 8.

Restricted and rare in Natal; Mozambique, Zaire, Uganda, Tanzania, Cameroun, Ivory Coast, Liberia, Sierra Leone and Fernando Po. On deeply shaded boulder faces in forest, 1 500–1 600 m. Map 57.

Vouchers: *Medley Wood* 11947 (BOL; NBG; NH; PRE); 11948 (K).

3. *Trichomanes rigidum* Swartz, Prodr. Veg. Ind. Occ. 137 (1788); Sim, Ferns S. Afr. edn 2: 68, t. 1 (1915); Schelpe in F.Z. Pterid.: 78, t. 22A (1970); in C.F.A. Pterid.: 64 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 190, t. 130 (1983). Type: Jamaica (S, holo.!: LD!: UPS!).

*Selenodesmium rigidum* (Swartz) Copel. in Philipp. J. Sci. 67: 81 (1938).

*Trichomanes dregei* Van den Bosch in Ned. Kruid. Archf. 4: 372 (1859). Type: Transkei, Lusikisiki, *Drège* s.n. (?P/PR, holo.; BM!).

Rhizome shortly creeping to suberect, c. 3 mm in diameter, set with dark brown hairs. *Fronds* tufted; *stipe* grey-brown when dried, up to 160 mm long, set with a few dark brown hairs basally; *lamina* 3- to 4-pinnatifid, narrowly ovate or lanceolate to oblong-lanceolate; *pinnae* 2- to 3-pinnatifid into numerous acute to rounded lobes c. 0,2 mm broad; *rhachis* narrowly winged. *Sori* borne near costae of pinnae, turbinate with rounded entire valves, c. 1,5 × 0,6 mm, often with a long persistent receptacle. Fig. 20: 7.

Transkei, Natal, Swaziland, Transvaal, Zimbabwe and Mozambique; widespread in tropical Africa and America. Shaded streambanks in forest, 1 370–1 890 m. Map 57.

Vouchers: *McLea* s.n. (BOL; K; SAM); *Medley Wood* s.n. (BOL; NH; PRE; SAM); 11948 (BOL; PRE; SAM); *Rudatis* 932 (BM; K; S; STE); *Ward* 950 (NU; PRU).

4. *Trichomanes pyxidiferum* L., Sp. Pl. 2: 1098 (1753). Iconotype: Plumier, Foug. Amer. 74, t. 50E (1705)!, from San Domingo.

The typical variety does not occur in Southern Africa.

Var. *melanotrichum* (Schlechtld.) Schelpe in Jl S. Afr. Bot. 30: 181 (1964); in F.Z. Pterid.: 78, t. 22C (1970); in C.F.A. Pterid.: 63 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 188, t. 128 (1983). Type: Cape Province, Plettenberg Bay, *Mund & Maire* s.n. (HAL, holo.!: B; P).

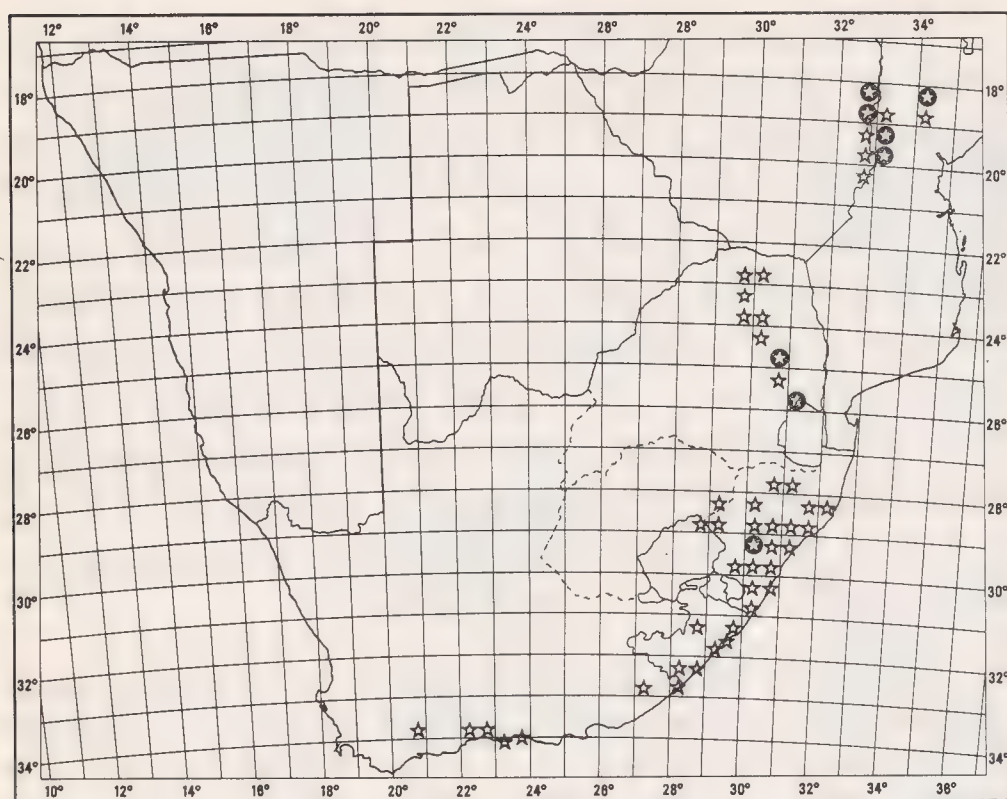
*Trichomanes melanotrichum* Schlechtld., Adumbr. 56 (1832); Kunze in Linnaea 10: 553 (1836). *Vandenboschia melanotricha* (Schlechtld.) Pichi-Sermolli in Webbia 12: 127, t. 1 (1955).

*Trichomanes pyxidiferum* sensu Sim, Ferns S. Afr. edn 2: 69, t. 3 fig. 3 (1915).

Rhizome set with black hairs. *Fronds* borne up to 30 mm apart; *stipe* narrowly winged in upper half, up to 25 mm long; *lamina* narrowly oblong to lanceolate or narrowly ovate, up to 70 × 25 mm, 2- to 3-pinnatifid; *pinnae* pinnatifid to 2-pinnatifid into rounded entire

FIG. 20.—1, *Hymenophyllum tunbridgense*, frond, × 0,6; 1a, detail of part of frond, × 2,4 (*Taylor* 1235). 2, *H. peltatum*, frond, × 0,6; 2a, detail of part of frond, × 1,8 (*Esterhuysen* 18547). 3, *H. capense*, frond, × 0,6; 3a, detail of part of frond, × 2,4 (*Esterhuysen* 2820). 4, *H. marlothii*, frond, × 0,6; 4a, detail of part of frond, × 2,4 (*Esterhuysen* 25367). 5, *H. polyanthos* var. *kuhnii*, frond, × 0,6; 5a, detail of part of frond, × 3 (*Schelpe* 5541). 6, *H. capillare*, frond, × 0,6; 6a, detail of part of frond, × 2,4 (*Phipps* 1265). 7, *Trichomanes rigidum*, frond, × 0,6; 7a, detail of part of frond, × 1,8 (*Drummond* 4951). 8, *T. erosum* var. *aerugineum*, frond, × 0,6; 8a, detail of part of frond, × 1,8 (*Chase* 6598). 9, *T. borbonicum*, frond, × 0,6; 9a, detail of part of frond, × 1,8 (*Schelpe* 6186). 10, *T. pyxidiferum* var. *melanotrichum*, frond, × 0,6; 10a, detail of part of frond, × 1,8 (*Schelpe* 6246). 11, *T. reptans*, frond, × 0,6; 11a, detail of part of frond, × 1,8 (*Schelpe* 6250).





MAP 58.—☆ *Trichomanes pyxidiferum* var. *melanotrichum*  
 ● *Trichomanes pyxidiferum* and *Trichomanes borbonicum*

lobes c. 0,7 mm broad, pinnae dark green when fresh but the lobes folded longitudinally on drying. *Sori* conical, very narrowly winged by lamina for part of its length, c. 1,5 × 1 mm, with entire rounded lobes. Fig. 20: 10.

South-western Cape Province to Transkei, Natal, Orange Free State, Swaziland and Transvaal; Zimbabwe, Mozambique, Angola, Zaire, Tanzania, Kenya, Uganda, Sudan, Ethiopia, Nigeria and Madagascar. A lithophyte and low-level epiphyte in forest, 1 450–2 160 m. Map 58.

Vouchers: *Burrows* 1437 (BOL; NBG); *Medley Wood* 11954 (NH; PRE; SAM); *Schelpé* 5044 (B; BM; BOL; GH; K; M; MO; P; PRE; S; US); *Schlechter* 6976 (GRA; PRE); *Van Jaarsveld* 6079 (BOL; NBG; PRE).

5. *Trichomanes borbonicum* *Van den Bosch* in *Ned. Kruid. Archf.*, ser. 1, 5, 2: 158 (1861); *Schelpé* in *F.Z. Pterid.*: 76, t. 22D (1970); *W. B. G. Jacobsen*, *Ferns Sthn Afr.* 189, t. 129 (1983). Type: Réunion, *Boivin* 908 (B, lecto.!: P!).

Rhizome set with brown hairs. *Fronde*s 10–40 mm apart; *stipe* filiform, narrowly winged in upper half; *lamina* oblong-lanceolate to narrowly elliptic, up to 100 × 35 mm; *pinnae* bilaterally pinnatifid to 2-pinnatifid into up to 12 linear rounded lobes c. 0,8 mm broad; *rhachis* winged. *Sori* usually borne in upper half of frond, cylindric to turbinate, winged by lamina for its whole length, c. 2 mm deep and c. 0,6 mm in diameter, with entire rounded valves and persistent prominent filiform receptacle. Fig. 20: 9.

Rare in Natal, Swaziland and Transvaal; Zimbabwe, Mozambique, Zaire, Tanzania, Kenya, Cameroun, Ghana, Fernando Po, Sao Tomé, Madagascar and Mascarene Islands. On moist shaded boulder faces in forest, 1 500–1 900 m. Map 58.

Vouchers: *Burrows* 1361 (BOL; NBG); *Schelpé* 6186 (BM; BOL; K); *Wager* N.22 (PRE).

## 2. HYMENOPHYLLUM

*Hymenophyllum* *J.E. Sm.* in *Memorie Accad. Sci. Torino* 5: 418, t. 9, 8 (1793); *Engl.*, *Pflanzenw. Afr.* 2: 5 (1908); *Tardieu-Blot* in *Fl. Madag.* 3: 2 (1951); in *Mém. Inst. fr. Afr. noire* 28: 34 (1953); *Alston* in *F.W.T.A. edn 2, Suppl.* 31 (1959); *Tardieu-Blot* in *Fl. Gabon* 8: 55 (1964); in *Fl. Camer.* 3: 72 (1964); *Schelpé* in *F.Z. Pterid.*: 78 (1970); in *Expl. Hydrobiol. Bassin L. Bangw. & Luapula* 8, 3 *Pterid.*: 42 (1973); in *C.F.A. Pterid.*: 64 (1977). Lectotype species: *H. tunbridgense* (L.) *J.E. Sm.* (= *Trichomanes tunbridgense* L.).

Rhizome filiform, widely creeping, subglabrous. *Fronde*s pinnately divided to 3-pinnatifid, or flabellate, glabrous or set with stellate hairs, segments entire or serrate; *veins* free. *Sori* with 2 indusial valves enclosing receptacle.

The genus *Hymenophyllum*, as construed here, comprises some 300 species and is largely confined to the tropics and the temperate and subantarctic zones of the Southern Hemisphere.

1a *Fronde*s with stellate hairs:

2a *Fronde*s deltoid to oblong; rhachis winged ..... 1. *H. marlothii*

2b *Fronde*s linear-oblong; rhachis not winged ..... 2. *H. capillare*

1b *Fronde*s glabrous:

3a Ultimate segments of frond dentate:

4a *Pinnae* unilaterally divided on acroscopic side only; indusial lobes entire to erose ..... 3. *H. peltatum*

4b *Pinnae* divided on both sides; indusial lobes dentate ..... 4. *H. tunbridgense*

3b Ultimate segments of frond entire:

5a Basal *pinnae* with fewer than 5 lobes ..... 5. *H. capense*

5b Basal *pinnae* with more than 10 lobes ..... 6. *H. polyanthos* var. *kuhnii*



1. **Hymenophyllum marlothii** Brause in Feddes Repert. 11: 112 (1912); Sim, Ferns S. Afr. edn 2: 76, t. 4 fig. 1 (1915); W. B. G. Jacobson, Ferns Sthn Afr. 192, t. 132 (1983). Type: Cape Province, Cape Peninsula, Table Mountain, Skeleton Gorge, *Marloth* 5169 (B, holo.!, PRE!).

Rhizome creeping. *Fronde*s borne 2–50 mm apart; *stipe* filiform, 8–52 mm long, not winged, set with stellate hairs; *lamina* deltoid-lanceolate to oblong-lanceolate, up to 80 × 26 mm; *pinnae* pinnatifid to 2-pinnatifid into up to 13 linear entire rounded lobes c. 1,5 mm broad and up to 7 mm long, set with stalked stellate hairs on margins and veins; *rhachis* winged. *Sori* borne at apices of lobes in upper part of frond, small, shallow, indusial valves 0,5 mm broad, set with stellate hairs. Fig. 20: 4.

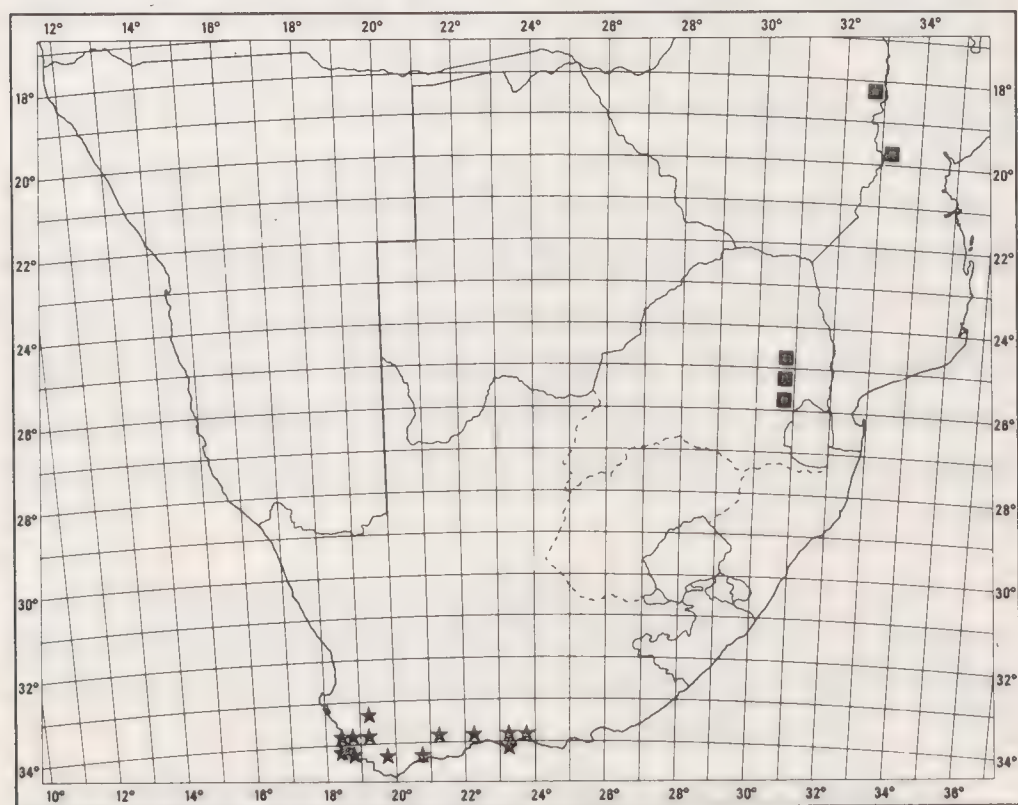
Endemic to south-western and southern Cape Province. Locally common on the Cape Peninsula on wet overhanging rock faces, usually in the shade of gully forest. Also on decaying fallen tree trunks in wet forest. Map 59.

Vouchers: *Esterhuysen* 7081 (BOL; K; NBG; PRE); 12538 (BOL; NBG; PRE); *Schelp*e 4697 (B; BOL; GH; K; M; MO; P; PRE; S; SRGH; US).

2. **Hymenophyllum capillare** Desv. in Mém. Soc. Linn., Paris 6, 2: 333 (1827); *Schelp*e in F.Z. Pterid.: 80, t. 22H (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 195, t. 135 (1983). Type: ? Mascarene Islands (P, holo.).

*Sphaerocionium capillare* (Desv.) Copel., Philipp. J. Sci. 67: 33 (1938).

*Hymenophyllum lineare* sensu Sim, Ferns S. Afr. edn 2: 78, t. 5 fig. 2 (1915).



MAP 59.—★ **Hymenophyllum marlothii**  
■ **Hymenophyllum capillare**

Rhizome creeping. *Fronde*s borne 40–50 mm apart; *stipe* filiform, 10–35 mm long, not winged but set with stellate hairs; *lamina* linear, up to 150 × 23 mm; *pinnae* pinnatifid (with frequent bilobing of acroscopic basal segment) into up to 7 linear, entire, broadly acute to rounded, lobes, 9 × 1,5 mm, set with stalked stellate hairs on margins and veins; *rhachis* not winged, set with stellate hairs. *Sori* borne at apices of lobes, obconic, 1–1,2 mm in diameter, with rounded indusial valves set with stellate hairs. Fig. 20: 6.

Transvaal, Zimbabwe, Mozambique, Kenya, Uganda, Tanzania, Cameroun, Ghana, Zaire, Madagascar, Réunion and Comoro Islands. Sheltered rock faces in forest, 1 700–2 140 m. Map. 59.

Vouchers: *Hardcastle* 96 (PRE); *Roux* 385 (NBG); *Van der Schijff* 4301 (BM; BOL; NU; PRU).

3. **Hymenophyllum peltatum** (Poir.) Desv. in Mém. Soc. Linn., Paris 6, 2: 333 (1827); W. B. G. Jacobsen, Ferns Sthn Afr. 195, t. 136 (1983). Type: Mauritius, *Bory* s.n. (P, holo.).

*Trichomanes peltatum* Poir. in Lam., Encycl. 8: 76 (1808).

*Hymenophyllum meyeri* Presl, Hymenophyll.: 31, 50 (1843). Type: Cape Province, Worcester, Du Toits Kloof, *Drège* b pro parte (?PR; holo.; BM!; S!).

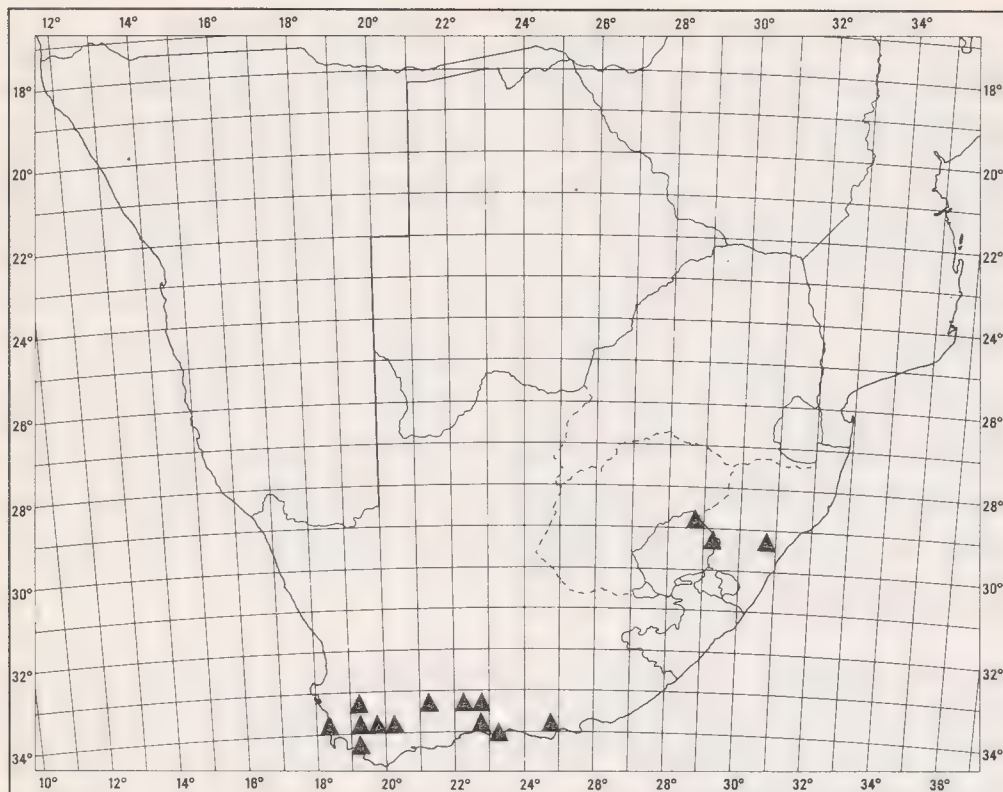
*Hymenophyllum uncinatum* Sim, Ferns S. Afr. edn 2: 81, t. 5 fig. 1 (1915). Type: Cape Province, Cape Peninsula, Table Mountain, *Kassner* 1007 (PRE, holo.!).

Rhizome creeping. *Fronde*s borne 5–50 mm apart; *stipe* filiform, narrowly winged for part of its length; *lamina* narrowly oblong to linear with lowest *pinnae* usually reduced, 10–180 mm long and up to 15 mm broad; *pinnae* glabrous, bifid to unilaterally pinnatifid on acroscopic side forming up to 6 linear-oblong serrate lobes up to 1,5 mm broad with rounded apices; *rhachis* narrowly winged. *Sori* usually on basal acroscopic segments of *pinnae*, with ovate rounded entire indusial valves c. 1,5 mm broad, *lamina* around sorus reduced or absent. Fig. 20: 2.

Cape Province; rare in Natal, Orange Free State. Also found in Uganda and on Madagascar, Mauritius, Réunion, Marion Island, Gough Island, Tristan da Cunha, Azores and Madeira; Norway, France, the British Isles, Chile, Falkland Islands, Patagonia, south-western Australia, Tasmania and New Zealand. Bases of cliffs and rocky recesses, usually south aspect, 200–3 200 m. Map 60.

Vouchers: *Andreae* 1353 (PRE); *Esterhuysen* 25882 (BM; BOL).



MAP 60.—*Hymenophyllum peltatum*

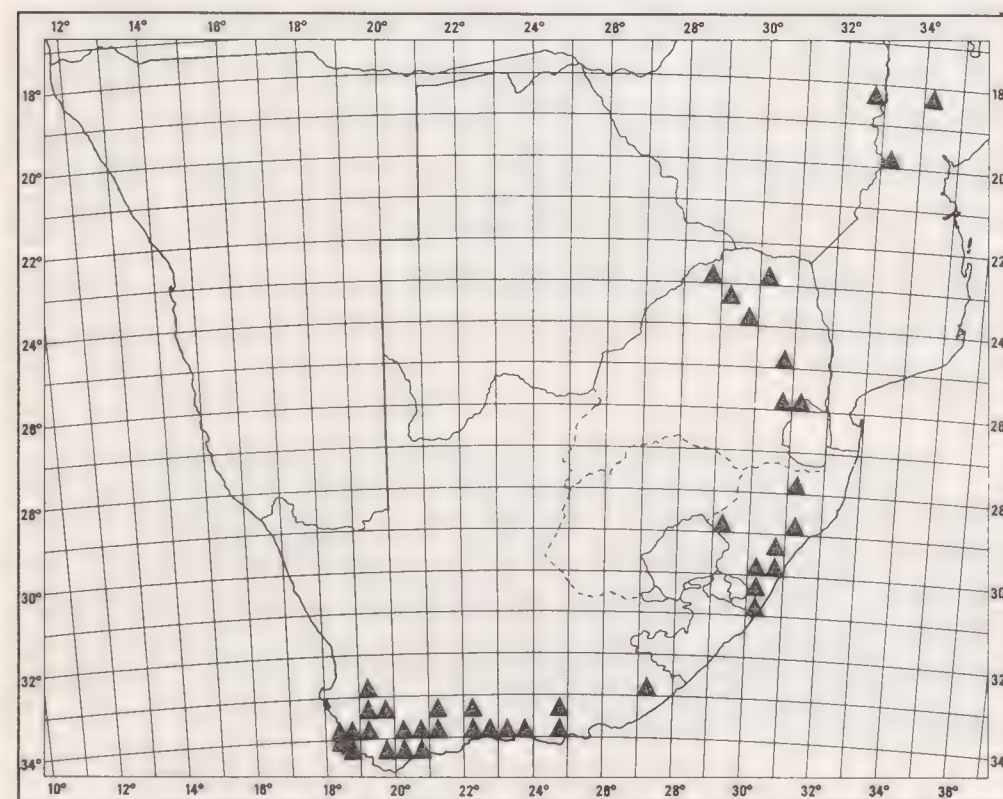
#### 4. *Hymenophyllum tunbridgense* (L.)

*J.E. Sm.* in Sowerby, *English Bot.* 3: t. 162 (1794); *Sim*, *Ferns S. Afr.* edn 2: 79, t. 3 fig. 1 (1915); *Schelp* in *F.Z. Pterid.*: 80, t. 22E (1970); *W. B. G. Jacobsen*, *Ferns Sthn Afr.* 194, t. 134 (1983). Type: England, Tunbridge, Herb. Banks (LINN 1253/5, holo.).

*Trichomanes tunbridgense* L., *Sp. Pl.* 2: 1098 (1753), as *tunbrigense*.

*Hymenophyllum dregeanum* Presl, *Hymenophyll.*: 32, 52 (1844), reimpr. in *Abh. K. Böhm. Ges. Wiss.*, Ser. 5, 3: 124, 144 (1845). Type: Cape Province, Cape Peninsula, Table Mountain, *Drège* a pro parte (?PR, holo.; L-BOL, photo.).

Rhizome creeping. *Fronds* borne up to 70 mm apart; *stipe* filiform, narrowly winged in upper part; *lamina* lanceolate, narrowly oblong or narrowly elliptic, up to 100 × 30 mm; *pinnae* bilaterally pinnatifid to 2-pinnatifid into up to 25 linear serrate rounded lobes c. 1 mm

MAP 61.—*Hymenophyllum tunbridgense*

broad; *rhachis* narrowly winged. *Sori* usually borne on lowest acroscopic pinnules, with ovate serrate indusial valves c. 1,1 mm broad, base of sorus not winged by lamina lobes. Fig. 20: 1.

Cape Province, Natal, Swaziland, Transvaal, Zimbabwe, Mozambique, Malawi, Tanzania, central Madagascar, Madeira, as well as western and southern Europe. Also Gabon (*Tardieu-Blot*, 1953). Sheltered rock faces, 1 700–2 440 m. Map 61.

Vouchers: *Esterhuysen* 14448 (BOL; K; NBG; PRE); 21529 (BOL, NBG); *Rodin* 3223 (BOL; K; PRE; S); *Rudatis* 1357 (BM; K; PRE); *Schelp* 4698 (B; BOL; GH; K; M; MO; P; PRE; S; SRGH; US).

5. *Hymenophyllum capense* *Schrad.* in *Gött. Gel. Anz.* 1818: 919 (1818); *Schelp* in *F.Z. Pterid.*: 79 (1970); *W. B. G. Jacobsen*, *Ferns Sthn Afr.* 193, t. 20, 133 (1983). Type: Cape of Good Hope, *Hesse* s.n. (LE, holo.!–BOL, photo.).

*Hymenophyllum thunbergii* Eckl. ex Presl, *Hymenophyll.*: 32 (1843), nom. nud. Type from Cape of Good Hope (LE!).

*Hymenophyllum natalense* Van den Bosch in *Ned. Kruid. Archf.* 4: 386 (1859). Syntypes: Port Natal, *Gueinzus* (K!); Kley River, *Zeyher* (K!); Genadenthal, *Breutel* (K!).

*Hymenophyllum zeyheri* Van den Bosch, l.c. 388 (1859). Type: South Africa, *Zeyher* s.n. (K, holo.).

*Hymenophyllum tabulare* Van den Bosch, l.c. 397 (1859). Syntypes: Cape Province, Tafelberg, Duivelsberg, Hollandsberg, *Ecklon* (K!), *Zeyher* (K!; P-BOL, photo.) and *Drège* (K!).

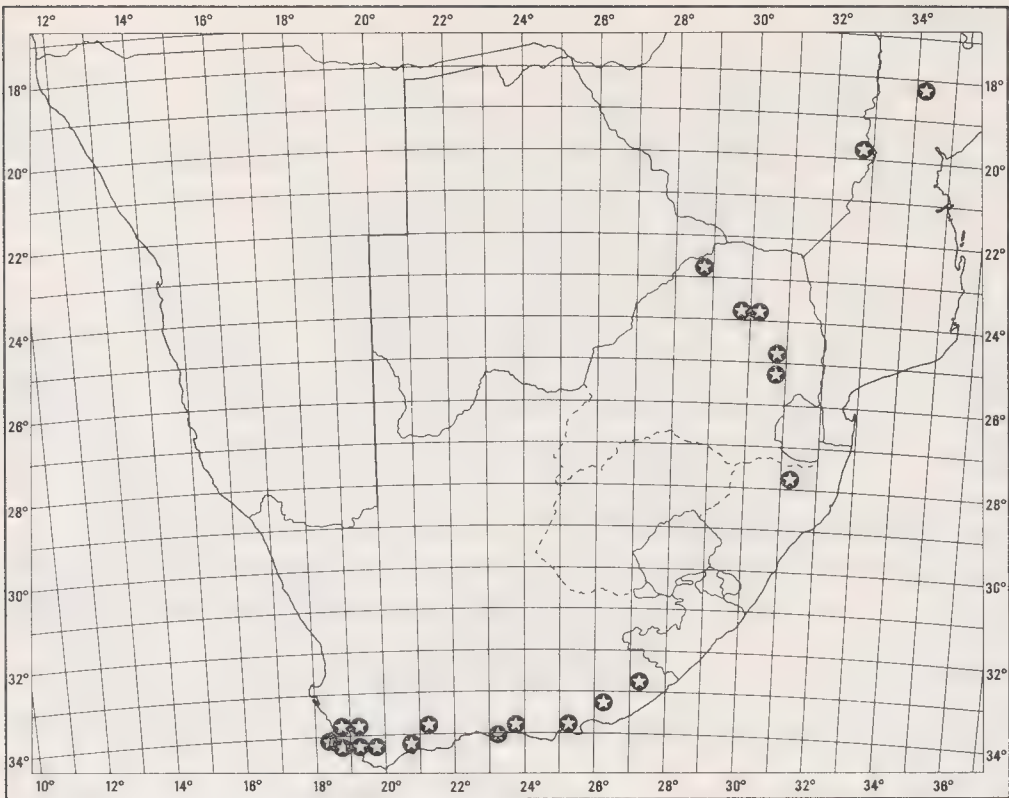
*Hymenophyllum fumarioides* sensu *Sim*, *Ferns S. Afr.* edn 2: 74, t. 3 fig. 2 (1915).

Rhizome creeping. *Fronds* borne 5–70 mm apart; *stipe* filiform, narrowly winged for part of its length, up to 50 mm long; *lamina* usually 2-pinnatifid, lanceolate to narrowly oblong, lowest pinnae often reduced, up to 100 × 16 mm; *pinnae* entire, up to 10 mm long, bifurcate to pinnatifid into 3–7 entire closely spaced lobes up to 1,5 mm broad with rounded apices. *Sori* borne on acroscopic segments anywhere in upper half of frond, broadly obconic with rounded entire indusial valves 2 mm broad and with lamina segments usually dilated around sorus. Fig. 20: 3.

Cape Province; less frequent in Natal and eastern and northern Transvaal, Mozambique, Malawi, Tanzania and Madagascar. Lithophytic in sheltered rock crevices, 1 500–1 800 m. Map 62.

Vouchers: *Bolus* 1381 (BM; BOL; K; SAM); *MacOwan* 1450 (BM; BOL; K; SAM); *Schelp* 1655 (BOL; NH; NU); 4699 (B; BOL; GH; K; M; MO; P; PRE; S; US); *Sim* s.n. (GRA; NH; PRE).





MAP 62.—*Hymenophyllum capense*

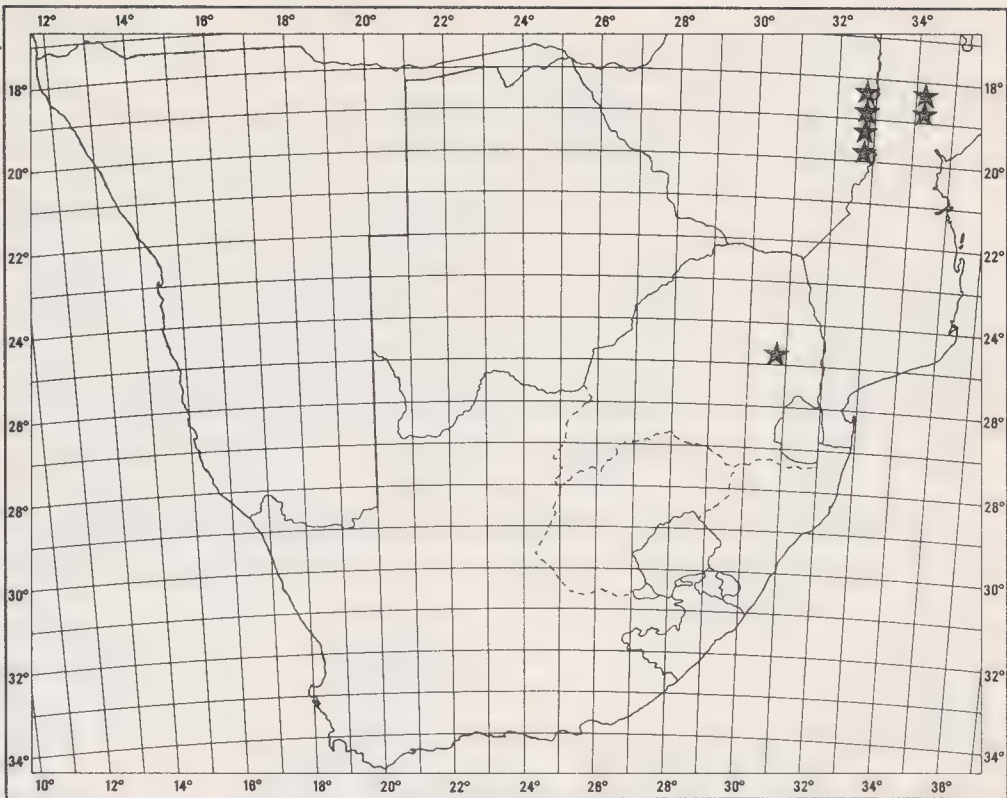
6. *Hymenophyllum polyanthos* Swartz in J. Bot., Gött. 1800, 2:102 (1801). Type: Jamaica (B!, LD!, UPS!, ? isotypes).

The typical variety does not occur in Southern Africa. Var. *mossambicense* Schelpe is known from Zimbabwe, Mozambique and Malawi. Only one variety occurs in Southern Africa:

Var. *kuhnii* (C. Chr.) Schelpe in Bolm. Soc. broteriana, sér. 2, 40:156 (1966); in F.Z. Pterid.: 80 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 197, t. 137 (1983). Type: Tanzania, Kilimanjaro, *Meyer* 310 (B, holo.!).

*Hymenophyllum kuhnii* C. Chr., Ind. Fil. 363 (1905). *Mecodium kuhnii* (C. Chr.) Copel. in Philipp. J. Sci. 67: 19 (1938).

Rhizome filiform. *Fronds* borne up to 10–100 mm apart; *stipe* filiform, up to 50 mm



MAP 63.—*Hymenophyllum polyanthos* var. *kuhnii*

long, narrowly winged at least in upper half; *lamina* usually oblong to elliptic in large plants, up to 450 × 45 mm; *pinnae* up to 50 × 13 mm, pinnatifid to 2-pinnatifid into up to 180 linear, entire, rounded lobes each up to c. 1 × 2,5 mm; *ultimate lobes* set close together or overlapping; *rhachis* narrowly winged. *Sori* borne on acroscopic basal segments of *pinnae*, very broadly obconic with ovate-acute, entire indusial valves up to c. 1,2 mm broad. Fig. 20: 5.

Transvaal, Zimbabwe, Mozambique, Malawi, Zaire, Tanzania, Kenya, Uganda, Cameroun, Nigeria, Liberia, Sierra Leone, Fernando Po and São Tomé. Epiphyte in montane forest, 1 700–2 250 m. Map 63.

Voucher: *Van der Schijff* 6264 (K; PRU).

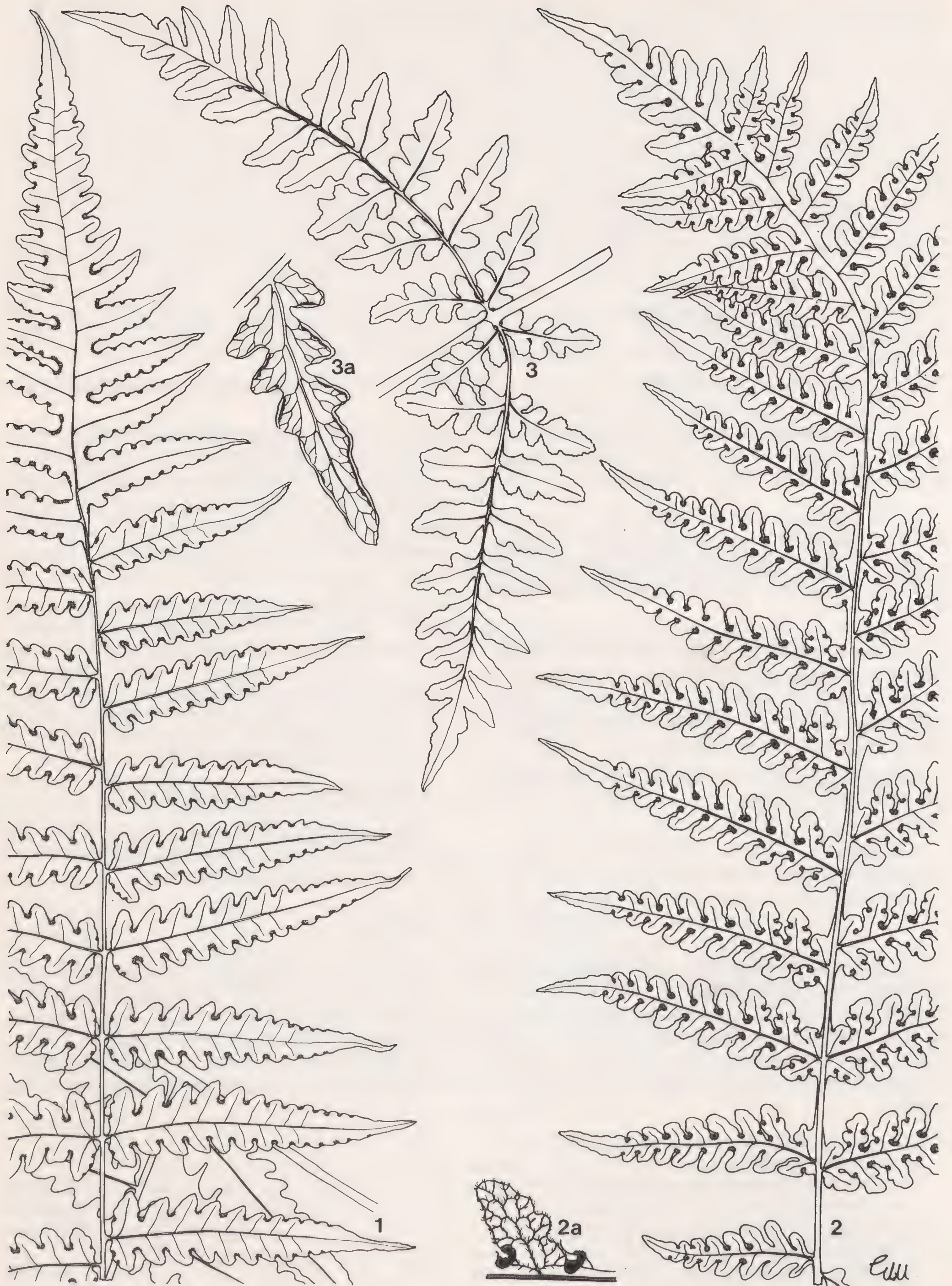
Only one collection of this species has so far been made in Southern Africa. It is distinguished from *H. capense* by the very divided basal *pinnae*.

DENNSTAEDTIACEAE

Large terrestrial ferns with hairy creeping or erect rhizomes with single or complex double solenosteles. *Stipes* with undivided or dissected U-shaped vascular strands. *Fronds* large, 3- to 4-pinnate, with continuous apical growth in *Hypolepis*. *Veins* free or anastomosing. *Sori* marginal, submarginal or superficial near margin, small, subcircular to elongate; *indusium* absent, or ovate and shallowly cupped (*Microlepia*), or linear or with leaf margin modified to form a pseudo-indusium (*Hypolepis*), or both pseudo-indusia and true indusia present; *soral paraphyses* present or absent.

- 1a Veins mostly free, rarely anastomosing:
  - 2a *Sori* small, subcircular:
    - 3a *Sori* opening towards margin; spores trilete.....4. *Microlepia*
    - 3b *Sori* opening inwards; spores monolete.....5. *Hypolepis*
  - 2b *Sori* elongate, marginal or apparently marginal .....3. *Pteridium*
- 1b Veins anastomosing freely:
  - 4a *Fronds* pubescent or hirsute, at least on under surface ..... 1. *Blotiella*
  - 4b *Fronds* glabrous and glaucous .....2. *Histiopteris*







1. **BLOTIELLA**

**Blotiella** Tryon in Contr. Gray Herb. Harv. 191: 96 (1962); Schelpe in F.Z. Pterid.: 81 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 43 (1973); in C.F.A. Pterid.: 66 (1977). Type species: *B. glabra* (Bory) Tryon (= *Lonchitis glabra* Bory).

Rhizome erect or creeping, often massive, set with reddish brown hairs. *Fronds* tufted, large; *lamina* pinnate to 3-pinnate, usually thinly pubescent at least on under surface, ultimate segments sinuate or crenate; *veins* anastomosing freely. *Sori* marginal, either small and confined to bases of sinuses or elongate and extending around sinuses and lobes; *indusia* marginal, membranous.

A genus of 16 species, all in Africa, Madagascar and Mascarene Islands except for one American species. A taxonomically difficult genus because of variation in dissection exhibited by fronds of different sizes in the same species and inadequate collections of complete fronds.

Pinnae conspicuously progressively more deeply incised from apex to base; rhizome erect ..... 1. *B. natalensis*  
Pinnae nearly uniformly incised from apex to base; rhizome creeping ..... 2. *B. glabra*

1. **Blotiella natalensis** (Hook.) Tryon in Contr. Gray Herb. Harv. 191: 99 (1962); Schelpe in F.Z. Pterid.: 82 (1970); in C.F.A. Pterid.: 68 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 205, t. 144 (1983). Type: Natal, Durban, *Pappe* s.n. (K, holo.).

*Lonchitis natalensis* Hook., Sp. Fil. 2: 57, t. 89B (1851).

*Lonchitis pubescens* sensu Sim, Ferns S. Afr. edn 2: 26, pro parte quoad t. 131 (1915), non Willd. ex Kaulf. (1824).

Rhizome erect, massive, set with pale brown hairs. *Stipe* stramineous, c. 1 m long, thinly pubescent with pale soft hairs; *lamina* 2-pinnatifid to 2-pinnate, lanceolate in outline, up to 1,5 m long; *pinnae* narrowly oblong-acute, mostly incised into adnate, acute, deltate, crenate to sinuate lobes in smaller fronds, or into petiolulate, narrowly oblong, acute to acuminate, sinuate to pinnatifid pinnules up to 120 × 30 mm in larger fronds, upper surface darker than lower; *rhachis* and *secondary rhachises* thinly pubescent with pale hairs c. 1 mm long. *Sori* mostly small, subcircular, borne in marginal sinuses of pinna segments but sometimes with a few larger lunulate sori in larger sinuses; *indusia* pale, membranous. Fig. 21: 1.

Cape Province, Transkei, Natal, Zimbabwe, Angola, Mozambique, Zambia, Malawi, Madagascar, Seychelles and Comoro Islands. Confined to damp, heavily shaded situations along streambanks in forest, from near the coast to 1 700 m altitude. Map 64.

Vouchers: *Buchanan* s.n. (BOL; K); *Clarkson* 206 (BM; NU); *Guy & Ward* 16 (NPB; NU); *Sim* s.n. (PRE).

2. **Blotiella glabra** (Bory) Tryon in Contr. Gray Herb. Harv. 191: 99 (1962); Schelpe in F.Z. Pterid.: 82 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 204, t. 143 (1983). Type: Réunion, *Bory* s.n., Herb. Willdenow no. 20131 (?P, holo.; B!).

*Lonchitis glabra* Bory, Voy. Quatre Princ. Iles 1: 321 (1804). *Pteris glabra* (Bory) Mett., Fil. Hort. Bot. Lips. 59, t. 25 fig. 29 (1856).

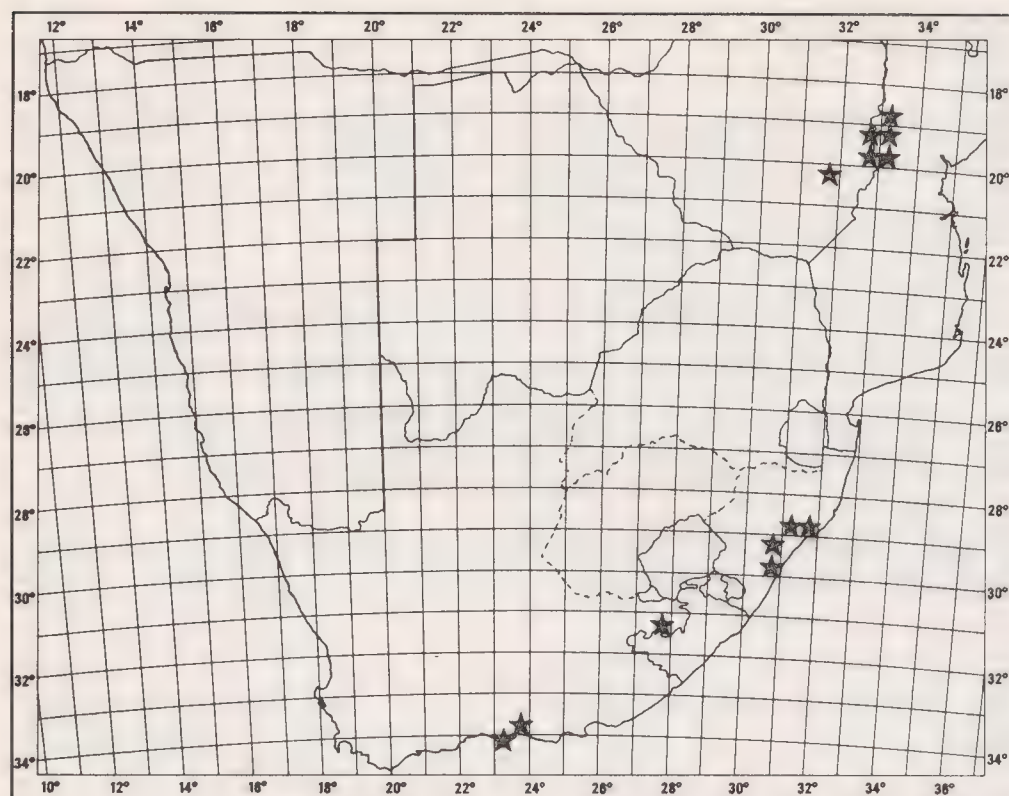
*Lonchitis stenochlamys* Fée, Mém. Fam. Foug. 5: 142 (1852). Type: Transkei, between the great waterfall and the Umsikaba River, *Drège* s.n. (BM!; K!).

*Lonchitis pubescens* sensu Sim, Ferns S. Afr. edn 2: 261, pro parte quoad t. 132 (1915), non Willd. ex Kaulf. (1824).

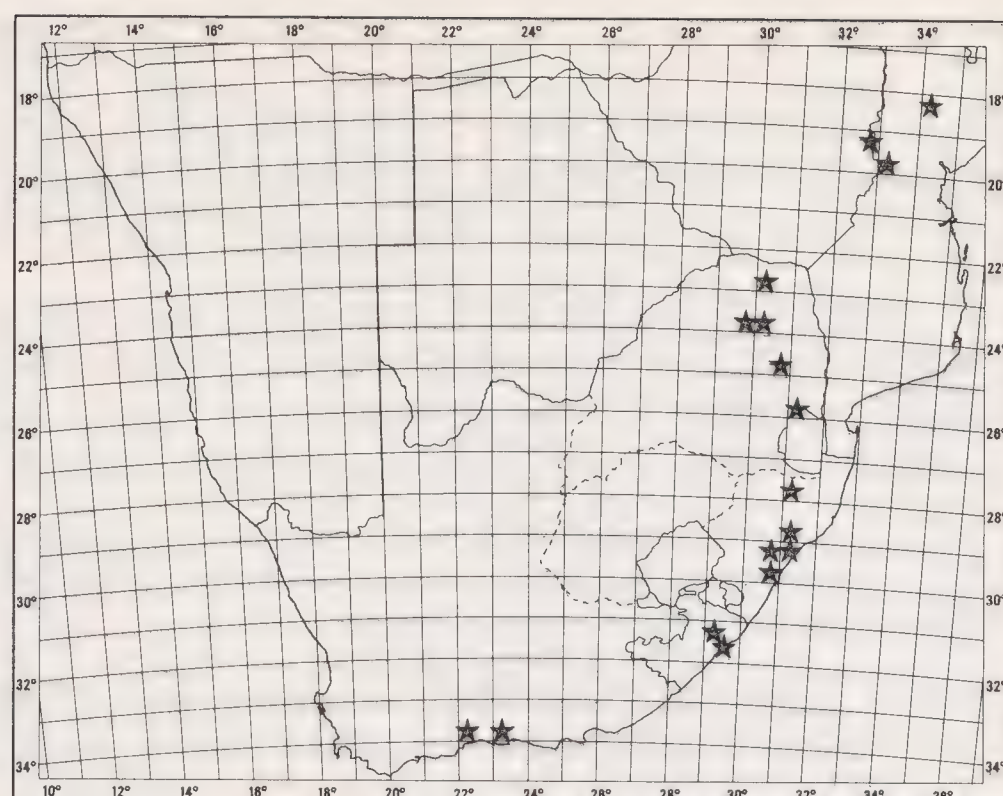
Rhizome creeping, massive, set with hairs up to 6 mm long. *Fronds* closely spaced; *stipe* pale brown, up to 0,8 m long, pubescent, later subglabrous; *lamina* elliptic, up to 1,3 × 0,8 m, lowest pinnae reduced, 2- to 3-pinnatifid, pinna costa narrowly winged for at least ¾ its length; *pinna lobes* oblong, adnate to rhachis, acute to acuminate, crenate, sinuate or pinnatifid into sinuate lobes, pinna lobes separated by broad sinuses, pubescent with pale soft hairs up to 1,5 mm long on costae and costules and less densely on veins and occasionally in the areoles on both surfaces. *Sori* mostly semicircular in small sinuses of frond segments, longer and lunulate in larger sinuses, up to 2 m in diameter; *indusium* membranous. Fig. 21: 2.

FIG. 21.—1, **Blotiella natalensis**, part of frond, × 0,6 (*Chase* 6603). 2, **Blotiella glabra**, part of frond, × 0,6; 2a, detail of lower surface of ultimate segment, × 1,2 (*Schelpe* 6165). 3, **Histiopteris incisa**, part of frond, × 0,6; 3a, lower surface of ultimate segments, × 1,2 (*Schelpe* 4997).



MAP 64.—*Blotiella natalensis*

Cape Province, Transkei, Natal, Swaziland, Transvaal, Zimbabwe, Mozambique and Zambia, the tropical African mountains and Réunion. Moist and shaded forest floors, 100–1 770 m. Map 65.

MAP 65.—*Blotiella glabra*

Vouchers: *Compton* 27833 (NBG; PRE); *Moss* 18494 (J); *Rodin* 1181 (BOL; K; S); *Schlechter* 2338 (BM; K; PRE); *Strey* 8765 (BOL; NH; NU).

## 2. HISTIOPTERIS

**Histiopteris** (*Agardh*) *J. Sm.*, Hist. Fil. 294 (1875); Engl., Pflanzenw. Afr. 2: 47 (1908); Tardieu-Blot in Mém. Inst. fr. Afr. noire 28: 67 (1953); in Fl. Madag. 5, 1: 68 (1958); Alston in F.W.T.A. edn 2, Suppl. 34 (1959); Tardieu-Blot in Fl. Gabon 8: 72 (1964); in Fl. Camer. 3: 97 (1964); Schelpe in F.Z. Pterid.: 84 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 45 (1973); in C.F.A. Pterid.: 70 (1977). Type species: *H. vespertilionis* (Labill.) *J. Sm.* (= *Pteris vespertilionis* Labill.).

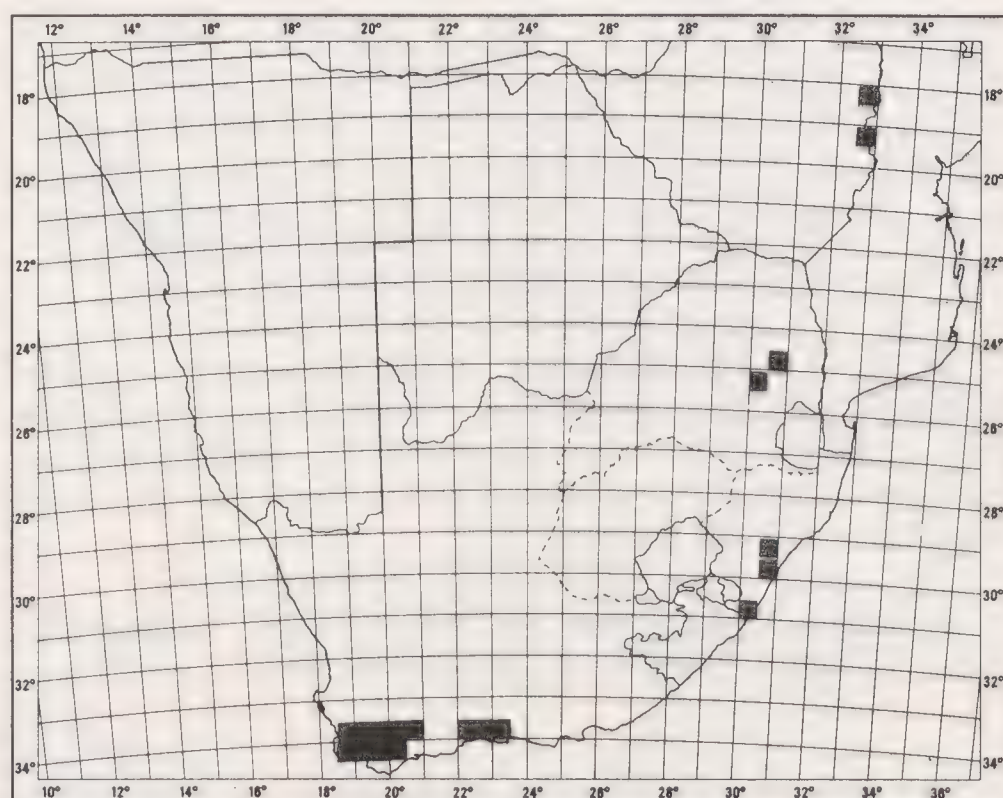
Rhizome widely creeping, set with brown hairs. *Fron*ds spaced; *lamina* 2-pinnatifid to 3-pinnatifid; *pinnae* opposite, sessile, with stipule-like basal pinnules or pinna lobes, glabrous, glaucous, firmly herbaceous to thinly coriaceous; *veins* anastomosing. *Sori* marginal, continuous, with paraphyses; *indusium* formed from reflexed margin of lamina.

A genus with one pantropic and south-temperate zone species (*H. incisa*) and a few Asiatic species.

**Histiopteris incisa** (*Thunb.*) *J. Sm.*, Hist. Fil. 294 (1875); Sim, Ferns S. Afr. edn 2: 263, t. 133 (1915); Schelpe in F.Z. Pterid.: 84, t. 24 (1970); in C.F.A. Pterid.: 70, t. 10 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 206, t. 145 (1983). Type: Cape Province, Grootvadersbosch, *Thunberg* s.n. (UPS, holo.!).

*Pteris incisa* Thunb., Prodr. 171 (1800). *Litobrochia incisa* (Thunb.) Presl, Tent. Pterid. 149 (1836); reimpr. in Abh. K. Böhm. Ges. Wiss., ser. 4, 5: 149 (1837). *Phegopteris incisa* (Thunb.) Keys., Polypod. Cyath. Herb. Bunge 51 (1873).

Rhizome subterranean, c. 5 mm in diameter, set with a dense felt of brown multicellular hairs. *Fron*ds erect to arching with pinnae held horizontally, 1–2 (3) m tall; *stipe* castaneous, glabrous, up to 0,6 m long; *lamina* pinnatifid to 2-pinnatifid, broadly lanceolate to ovate-deltate

MAP 66.—*Histiopteris incisa*



in outline, acute, up to  $0,4 \times 0,19$  m, basal pinna segments auriculate and developed very close to rhachis; ultimate lobes oblong, acute to obtuse, adnate, entire to sinuate, glaucous when fresh; *rhachis* reddish brown to pale brown nearer apex, terete, glabrous. *Sori* linear or rarely lunulate, up to 1 mm broad at maturity, borne along margins of ultimate lobes (lobes frequently with sterile apices); *indusium* membranous, entire. Fig. 21: 3.

Widespread in the Southern Hemisphere. Cape Province, Natal, Transvaal, Zimbabwe, Malawi, Zambia, Angola, Zaire, Tanzania, Uganda, Gabon, Equatorial Guinea, Liberia, Sierra Leone and Guinea, as well as Fernando Po, São Tomé, Ascension Island, Tristan da Cunha, Inaccessible Island, Nightingale Island, Gough Island, Madagascar, Comoro Islands, Mauritius and Réunion. In montane forest and on streambanks from 150–1 700 m. Map 66.

Vouchers: *Boucher* 220/4 (STE); *Esterhuysen* 14682 (BM; BOL); *Killick* 135 (NU); *Medley Wood* s.n. (NH; PRE); *Taylor* 1029 (BOL; NBG).

### 3. PTERIDIUM

**Pteridium** *Gled. ex Scop.*, Fl. Carniol. 169 (1760); Engl., Pflanzenw. Afr. 2: 47 (1908); Tryon in Contr. Gray Herb. Harv. 134: 11 (1941); Tardieu-Blot in Mém. Inst. fr. Afr. noire 28: 65 (1953); in Fl. Madag. 5, 1: 66 (1958); Alston in F.W.T.A. edn 2, Suppl. 33 (1959); Tardieu-Blot in Fl. Gabon 8: 70 (1964); in Fl. Camer. 3: 96 (1964); Schelpe in F.Z. Pterid.: 88 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 47 (1973); in C.F.A. Pterid.: 72 (1977), nom. conserv. Type species: *P. aquilinum* (L.) Kuhn (= *Pteris aquilinum* L.).

Rhizome creeping, subterranean, densely set with brown to castaneous hairs. *Fronde*s spaced; *stipe* with numerous vascular bundles and a felt of hairs just below ground level; *lamina* 3- to 4-pinnate, coriaceous, lower surface subglabrous to densely tomentose. *Sori* linear, submarginal, outer pseudo-indusium formed by reflexed margin and inner indusium which may be reduced.

A monotypic genus with numerous subspecies and varieties throughout the tropical and temperate regions of the world.

**Pteridium aquilinum** (L.) Kuhn in Von Deck., Reisen, Bot. 3, 3: 11 (1879); Sim, Ferns S. Afr. edn 2: 264, t. 134 (1915). Type: Europe.

*Pteris aquilina* L., Sp. Pl. 2: 1073 (1753). *Asplenium aquilinum* (L.) Bernh. in J. Bot., Gött. 1799, 1: 310 (1799). *Allosorus aquilinus* (L.) Presl, Tent. Pterid. 153 (1836). *Eupteris aquilina* (L.) Newm. in Phytologist 2: 278 (1845). *Paesia aquilina* (L.) Keys., Polypod. Cyath. Herb. Bunge 22 (1873). *Cincinalis aquilina* (L.) Gled. ex Trevisan in Atti Soc. ital. Sci. nat. 17: 239 (1874). *Ornithopteris aquilina* (L.) J. E. Sm., Hist. Fil. 298 (1875).

Only the typical subspecies occurs in Southern Africa. Subsp. *centrali-africanum* Hieron. occurs from Zimbabwe to East Africa and can be distinguished by its less divided lamina and larger basal pinnae.

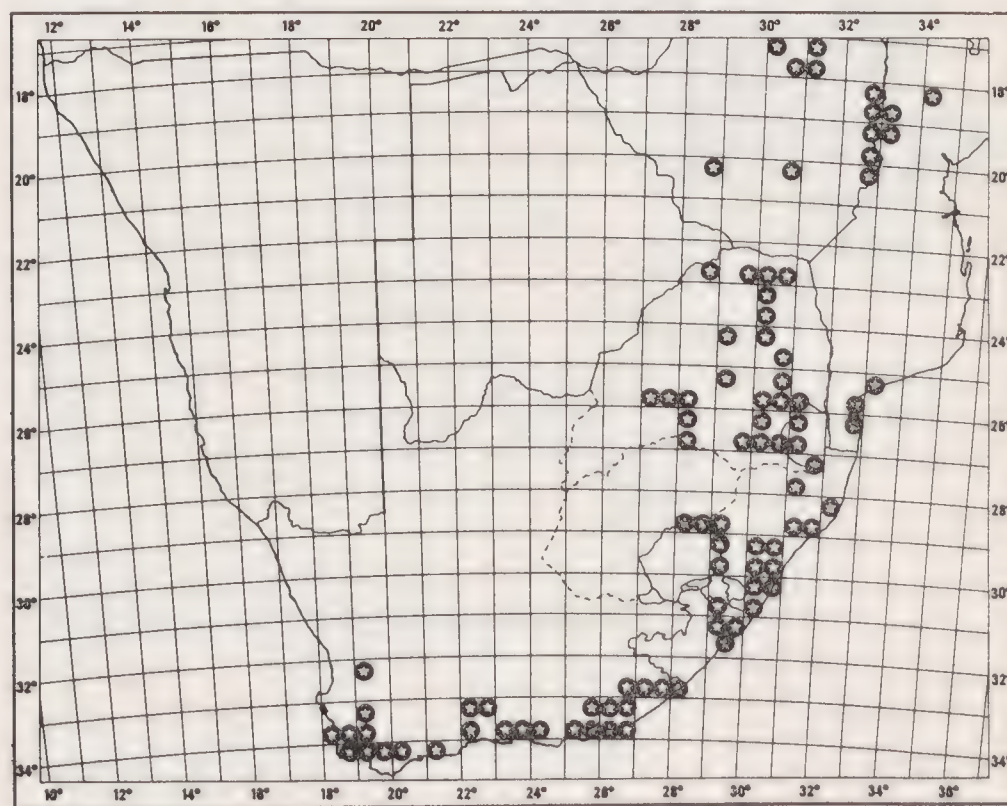
#### Subsp. *aquilinum*.

Schelpe in F.Z. Pterid.: 88 (1970); in C.F.A. Pterid.: 74 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 208, t. 38, 49, 146 (1983).

*Pteris capensis* Thunb., Prodr. 172 (1800). *Allosorus capensis* (Thunb.) Pappe & Raws., Syn. Fil. Afr. Austr. 32 (1858), non Presl (1836). *Pteridium capense* (Thunb.) Krasser in Annln naturh. Mus. Wien 15: 6 (1900). *Pteridium aquilinum* subsp. *capense* (Thunb.) C. Chr., Ind. Fil. 591 (1906). Type: Cape of Good Hope, *Thunberg* s.n. (UPS, holo.!).

*Pteris coriifolia* Kunze in Linnaea 18: 120 (1844). *Allosorus coriifolia* (Kunze) Pappe & Raws., Syn. Fil. Afr. Austr. 31 (1858). Type: Cape Peninsula, *Gueinzus* s.n. (LZ, holo.†).

Rhizome c. 7 mm in diameter when dried; *hairs* 1–1,5 mm long. *Fronde*s erect, 0,5–1,5 m tall, basal pinnae as long as to half as long as lamina and with pinnae ascending or held horizontally; *stipe* woody, brown, up to 0,4 m long, swollen just above ground level, glabrous



MAP 67.—*Pteridium aquilinum* subsp. *aquilinum*







above this level; *lamina* deltate to oblong-ovate, 3- to 4-pinnate; *pinnae* ovate-deltate to oblong, acute, up to  $0,4 \times 0,15$  m; *pinnule segments* deeply pinnatifid in larger pinnae into obtuse narrowly oblong lobes, upper surface glabrous to thinly pubescent, under surface subglabrous or thinly pubescent to densely pubescent-tomentose with pale brown hairs. *Sori* elongate, submarginal on ultimate segments; *pseudo-indusium* membranous, ciliate, c. 0,5 mm wide. Fig. 22.

Cape Province, Transkei, Natal, Lesotho, Orange Free State, Swaziland, Transvaal, Zimbabwe and Mozambique, and at higher altitudes through Malawi, Zambia, Angola, Zaire, Tanzania, Kenya, Uganda, Ethiopia, Sudan, Cameroun and Nigeria to Liberia and Sierra Leone, São Tomé, Fernando Po; Zanzibar, Comoro Islands, Madagascar and Mauritius. Also widespread in temperate Europe. Grasslands and forest margins, 750–2 340 m. Map 67.

Vouchers: Dieterlen 69 (K; PRE; SAM); Hardcastle 278 (NBG); Louw 2750 (STE); Pott 4855 (BOL; PRE); Ward 4322 (NPB; NU).

#### 4. MICROLEPIA

**Microlepia** Presl, Tent. Pterid. 124, t. 4, 21–23 (1836), reimpr. in Abh. K. Böhm. Ges. Wiss., ser. 4, 5: 124 (1837); Engl., Pflanzenw. Afr. 2: 21 (1908); Tardieu-Blot in Mém. Inst. fr. Afr. noire. 28: 58 (1953); in Fl. Madag. 5, 1: 9 (1958); Alston in F.W.T.A. edn 2, Suppl. 32 (1959); Tardieu-Blot in Fl. Gabon 8: 68 (1964); in Fl. Camer. 3: 94 (1964); Launert in F.S.W.A. 3: 1 (1969), as *Microlepis*; Schelpe in F.Z. Pterid.: 89 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 49 (1973); in C.F.A. Pterid.: 75 (1977). Type species: *M. polypodioides* (Swartz) Presl (= *Dicksonia polypodioides* Swartz).

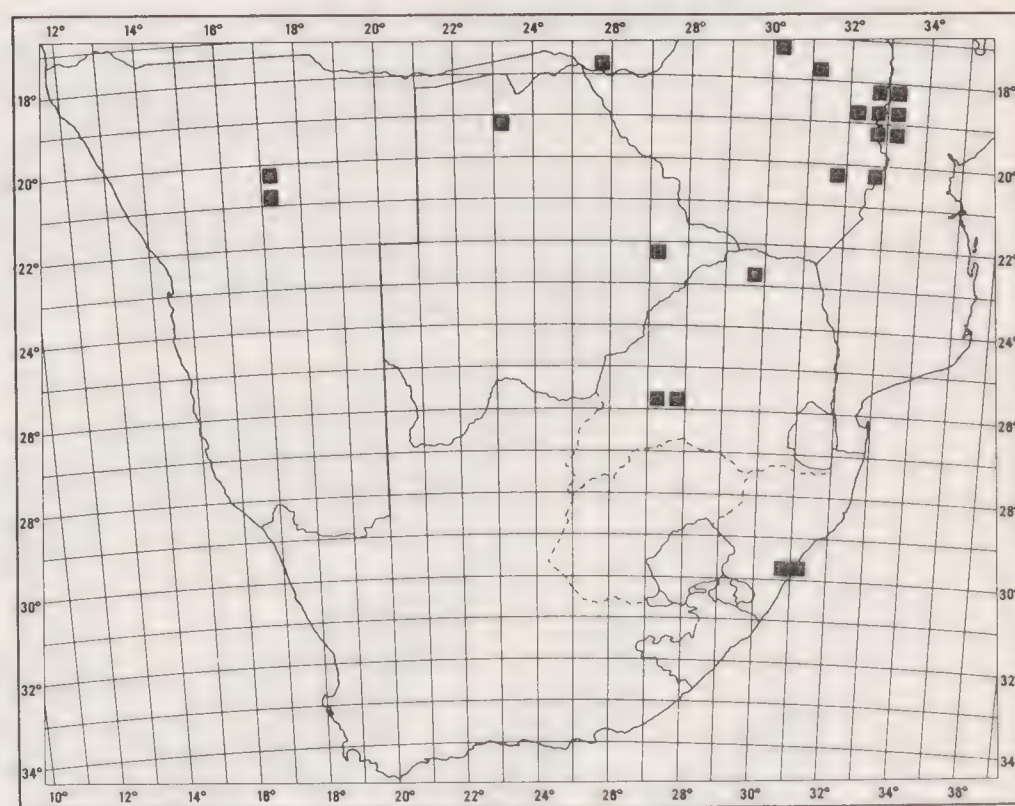
Rhizome creeping, set with brown hairs. *Fronds*: *stipe* closely spaced, shortly pubescent with a single U-shaped vascular bundle; *lamina* pinnate to 4-pinnatifid, often large, herbaceous, pubescent. *Sori* intramarginal, borne on a vein-ending; *indusium* small, membranous, cupped, opening outwards.

A genus of about 45 species, mostly of the Old World tropics but with one variable pantropic species occurring in Africa.

**Microlepia speluncae** (L.) T. Moore, Ind. Fil. 93 (1857); Sim, Ferns S. Afr. edn 2: 129, t. 38 (1915); Schelpe in F.Z. Pterid.: 89, t. 27 (1970); in C.F.A. Pterid.: 75, t. 8 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 210, t. 147 (1983). Type: Ceylon, Hermann s.n., Herb. Hermann fol. 41 (BM, lecto!).

*Polypodium speluncae* L., Sp. Pl. 2: 1093 (1753). *Aspidium speluncae* (L.) Willd. in L., Sp. Pl. edn 4, 5: 269 (1810). *Davallia speluncae* (L.) Bak. in Hook. & Bak., Syn. Fil. 100 (1867). *Scyphofilix speluncae* (L.) Farwell in Am. Midl. Nat. 12: 263 (1931).

Rhizome up to 10 mm in diameter, set with multicellular hairs up to 4 mm long. *Fronds* spaced up to 60 mm apart, erect to arching, fragile, up to 3 m long; *stipe* pale brown, often darker basally, becoming glabrous, up to 1 m long and 6 mm in diameter; *lamina* 3- to 4-pinnatifid; *pinnae* narrowly oblong to oblong-



MAP 68.—*Microlepia speluncae*







lanceolate, acute, up to  $600 \times 210$  mm; *ultimate segments* oblong-obtuse, crenate to pinnatifid, 4–12 mm long, thinly pubescent on both surfaces along veins and costules with pale multicellular hairs up to 0.4 mm long; *rhachis* thinly pubescent with minute hairs, eventually becoming glabrous. *Sori* small, round, c. 1 mm in diameter, borne on a vein-ending which shows as a conspicuous hydathode on upper surface. Fig. 23.

South West Africa/Namibia, Botswana, Natal and Transvaal, as well as central Africa and São Tomé, Madagascar, Seychelles and Comoro Islands. Pantropical, confined to moist shaded habitats either in swamp forest or on shaded streambanks in evergreen forest, up to 1 200 m. Map 68.

Vouchers: *Hillary* 85 (NU); *Obermeyer* s.n. (PRE); *Schelte* 4790 (B; BM; BOL; C; GH; K; M; MO; P; PR; PRE; S; US); *Smith* 584 (BOL; GAB; SRGH).

## 5. HYPOLEPIS

**Hypolepis** Bernh. in Neues J. Bot. 1, 2: 34 (1805); Engl., Pflanzenw. Afr. 2: 41 (1908); Tardieu-Blot in Mém. Inst. fr. Afr. noire 28: 59 (1953); in Fl. Madag. 5, 1: 6 (1958); Alston in F.W.T.A. edn 2, Suppl. 33 (1959); Tardieu-Blot in Fl. Camer. 3: 95 (1964); Schelte in F.Z. Pterid.: 92 (1970). Type species: *H. tenuifolia* (G. Forst.) Bernh. ex Presl (= *Lonchitis tenuifolia* G. Forst.).

Terrestrial plants with widely creeping subterranean rhizomes set with brown or reddish hairs. *Fronde*s often large, 2- to 5-pinnatifid, hairy or glabrous; *veins* free. *Sori* small, submarginal, protected by a reflexed marginal flap (pseudo-indusium) terminal on veins.

A genus of about 55 species, mostly pantropic or in the south temperate zone with one species in our region.

**Hypolepis sparsisora** (Schrad.) Kuhn, Fil. Afr. 120 (1868); Sim, Ferns S. Afr. edn 2: 236, t. 117 (1915); Schelte in F.Z. Pterid.: 92, t. 28 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 211, t. 148 (1983). Type: Cape Province, Hesse s.n. (?LE, holo.).

*Cheilanthes sparsisora* Schrad. in Gött. Gel. Anz. 1818: 918 (1818). *Phegopteris sparsisora* (Schrad.) Keys., Polypod. Cyath. Herb. Bunge 51 (1873).

*Cheilanthes aspera* Kaulf. in Linnaea 6: 186 (1831). *Hypolepis aspera* (Kaulf.) Presl, Tent. Pterid. 162 (1836), reimpr. in Abh. K. Böhm. Ges. Wiss., ser. 4, 5: 162 (1837). Type: Cape Province, Cape Peninsula, Table Mountain, Ecklon s.n. (LZ, holo.†; L!–BOL, photo.!).

*Cheilanthes anthriscifolia* Schlecht., Adumbr. 52, t. 32 (1832), ined. non Willd. (1810). *Hypolepis anthriscifolia* Presl, Tent. Pterid. 162 (1836), nom. nud.

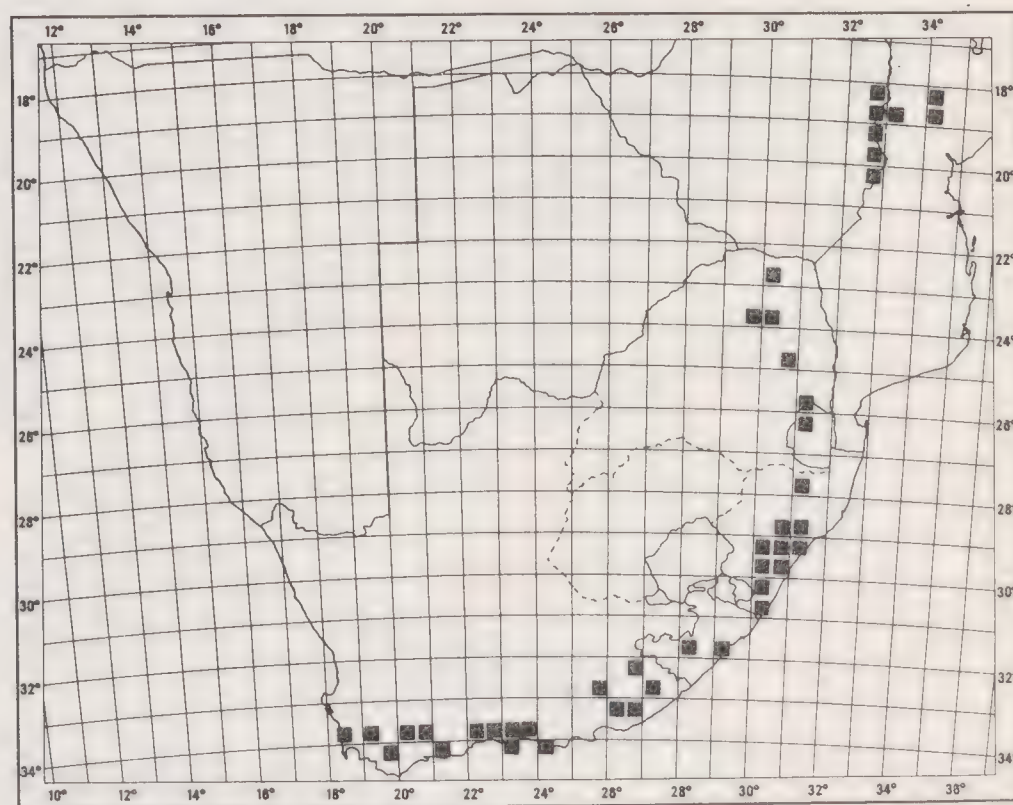
*Cheilanthes commutata* Kunze in Linnaea 10: 542 (1836), nom. illeg.

Rhizome up to 5 mm in diameter, set with multicellular brown hairs c. 1 mm long. *Fronde*s borne 0.2 m or more apart, erect, with pinnae held horizontally, usually about 1 m tall but occasionally forming thickets up to 3 m high; *stipe* pale brown, finally glabrous, up to 1 m long; *lamina* 3- to 5-pinnatifid; *pinnae* up to 1 m long (usually less), ovate-deltate; *ultimate segments* oblong, acute, crenate to pinnatifid, adnate, up to 10 mm long, glabrous except for a few scattered pale hairs on rhachis branches and

veins above and below; *rhachis* pale brown, glabrous. *Sori* borne singly on acroscopic margin of lobes of ultimate segments, c. 1 mm in diameter; *pseudo-indusium* semi-transparent, subentire. Fig. 24.

Cape Province, Transkei, Natal, Swaziland, Transvaal, Zimbabwe, Mozambique, Kenya, Uganda, Zaire, Cameroun, as well as Fernando Po, Sao Tomé, Comoro Islands, Madagascar, Mauritius and Réunion. Along streams in forests from 200 to 1 300 m. Map 69.

Vouchers: *Cooper* 1414 (BM; NH; PRE); *Fisher* 773 (BLFU; NH; NU; BOL); *Junod* 4430 (K; PRE); *Roux* 666 (NBG); *Schlechter* 2339 (BM; GRA; J; K; PRE).



MAP 69.—*Hypolepis sparsisora*







## VITTARIACEAE

Epiphytic or lithophytic plants, with creeping rhizomes set with clathrate rhizome scales. *Fronde*s sessile or stipitate, very narrowly linear to narrowly elliptic, suberect to pendulous, glabrous. *Sori* exindusiate, in two marginal, submarginal or intramarginal grooves; *paraphyses* present, intestiniform to turbinate. *Spores* monolete or trilete.

## VITTARIA

**Vittaria** J. E. Sm. in *Memorie Accad. Sci. Torino* 5: 413 t. 9, 5 (1793); *Engl. Pflanzenw. Afr.* 2: 48 (1908); Tardieu-Blot in *Mém. Inst. fr. Afr. noire* 28: 201 (1953); *Pic. Ser. in Webbia* 12: 698 (1957); Tardieu-Blot in *Fl. Madag.* 5, 1: 175 (1958); Alston in *F.W.T.A. edn 2, Suppl.* 35 (1959); Tardieu-Blot in *Fl. Gabon* 8: 94 (1964); in *Fl. Camer.* 3: 124 (1964); Schelpe in *F.Z. Pterid.*: 94 (1970); in *Expl. Hydrobiol. Bassin L. Bangw. & Luapula* 8, 3 *Pterid.* 49 (1973); in *C.F.A. Pterid.*: 76 (1977). Type species: *V. lineata* (L.) J.E. Sm. (= *Pteris lineata* L.).

## Description as for family.

A genus of about 70 often poorly differentiated species occurring in temperate and tropical regions.

**Vittaria isoetifolia** Bory, Voy. Quatre Princ. Iles 2: 325 (1804); Sim, *Ferns S. Afr.* edn 2: 267, t. 149 fig. 1 (1915); Schelpe in *Contr. Bolus Herb.* 1: 21 (1969); in *F.Z. Pterid.*: 94, t. 29B (1970); W.B.G. Jacobsen, *Ferns Sthn Afr.* 213, t. 149 (1983). Type: Réunion, Bory s.n., Herb. Willdenow no. 20026 (B, holo.).

*Oetosis isoetifolia* (Bory) Greene in *Pittonia* 4: 103 (1900).

*Vittaria coccygocarpa* Trevisan in *Atti Ist. Veneto* 2: 161 (1851), nom. nud.

*Vittaria gueinzii* Trevisan in tom. cit. 167 (1851). Type: South Africa, *Gueinzius* s.n. (Type not found).

*Vittaria sarmentosa* Ruiz, ex Fée, *Mém. Fam. Foug.* 3: 17 (1852). Syntypes: South Africa, *Drège* s.n. (BM!, K!); *Mundt & Maire* s.n.; *Gueinzius* s.n. (K!, S!).

*Vittaria tenera* Fée, tom. cit. 17, t. 2 fig. 1 (1852). Type: Natal, Port Natal (i.e. Durban), *Gueinzius* s.n. (Type not found).

*Vittaria longidentata* K. Muell. in *Bot. Ztg* 1854: 546, t. 13 fig. 2 (1854). Type: South Africa, *Gueinzius* s.n. (Type not found).

*Pteropsis angustifolia* Pappe & Raws., *Syn. Fil. Afr. Austr.* 43 (1857), non Desv. (1827). Type: Cape Province, Genadendal, *Kölbing* s.n. (Type not found).

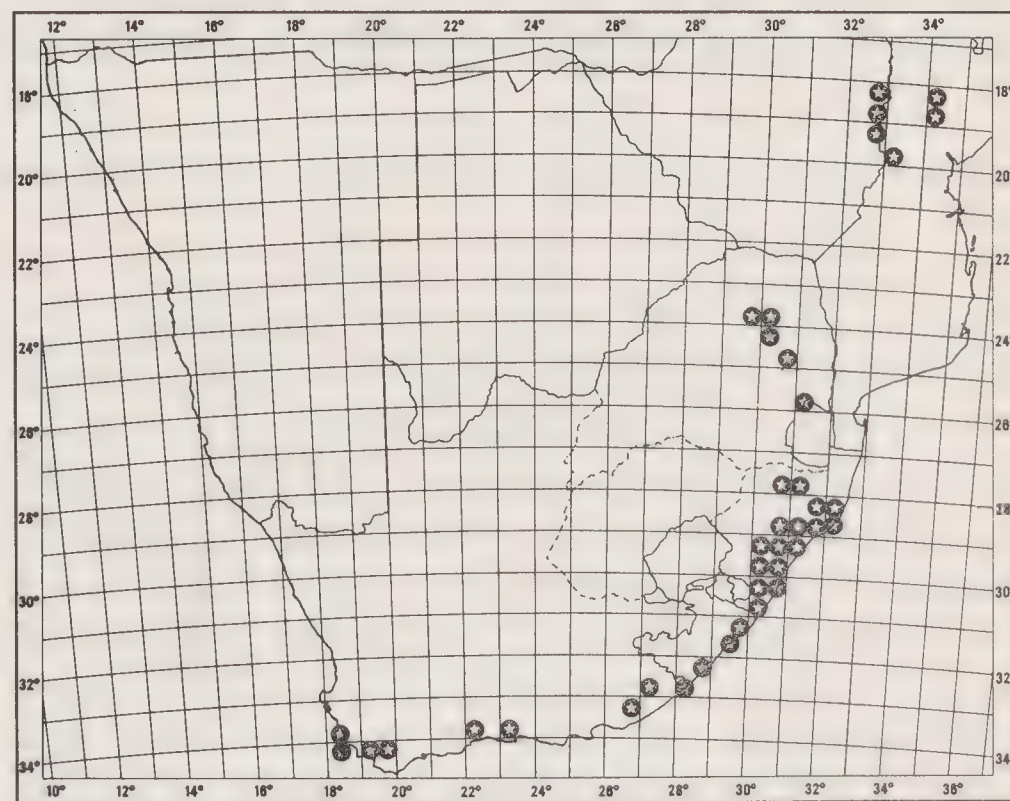
Rhizome shortly creeping, c. 3 mm in diameter, set with narrowly lanceolate, attenuate, clathrate, strongly pseudo-serrate, dark brown rhizome-scales up to 10 mm long. *Fronde*s tufted, simple, sessile, carnose-coriaceous, pendant; *lamina* very narrowly linear, with a pale brown or pale greyish green base

when dried; *midrib* and *veins* obscure. *Sori* in two deep intramarginal grooves and with intestiniform paraphyses. Fig. 25.

Cape Province, Transkei, Natal, Transvaal, Zimbabwe, Mozambique, Malawi, Tanzania, Madagascar, Mauritius and Réunion. Occasional low-level to mid-level epiphytes on old trees in moist forest habitats in the southern and eastern parts of Southern Africa, from near sea level in the Knysna forests to c. 2 000 m in south-eastern Africa. Map 70.

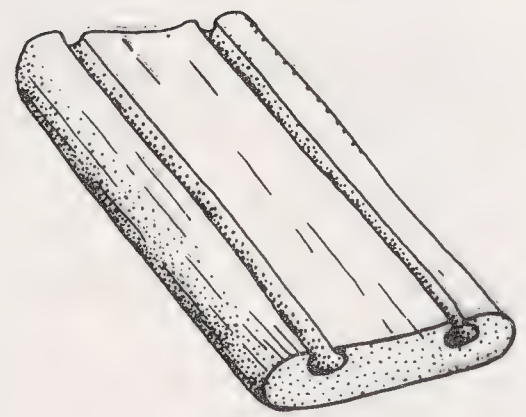
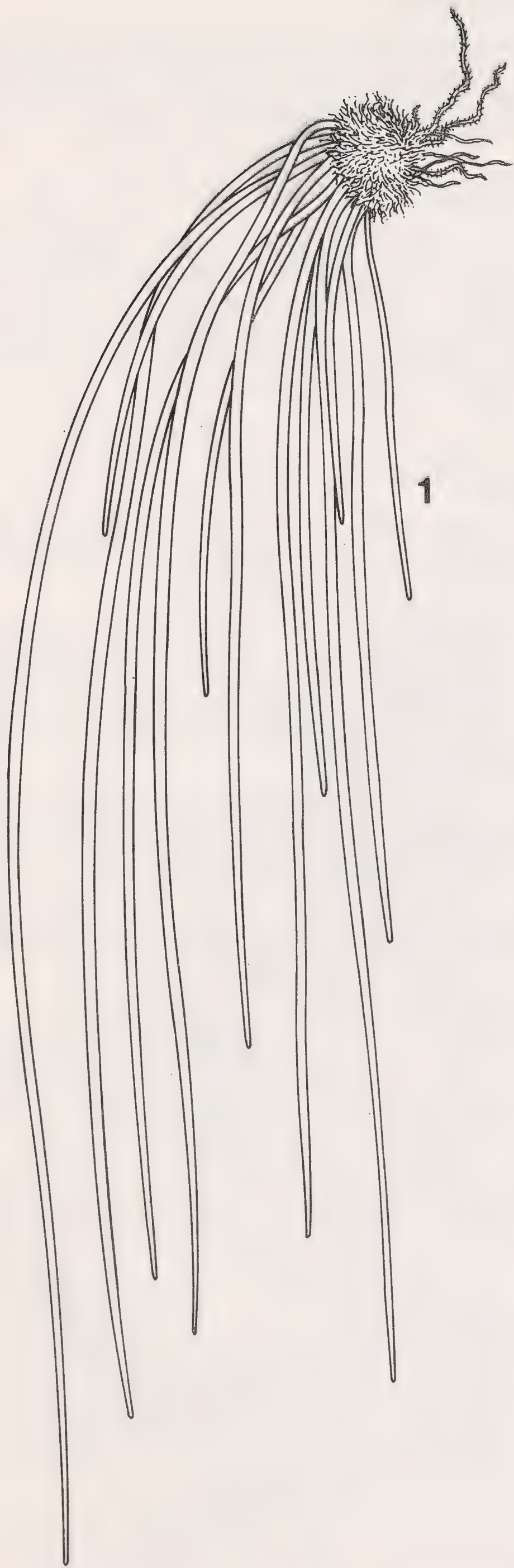
Vouchers: *Esterhuysen* 14387 (BOL; K; NBG); *Johnstone* 279 (BM; NH; NU); *Schlechter* 2716 (BM; GRA; J; K; PRE); *Sim* s.n. sub *MacOwan* 1591 (GRA; K; PRE; S; SAM); *Thode* A1275 (K; NH; PRE).

On the mountains of south-western Cape Province the plants are much smaller and are confined to sheltered sandstone crevices in the summer mist-belt.



MAP 70.—*Vittaria isoetifolia*







## ADIANTACEAE/PTERIDACEAE

Terrestrial, or aquatic (*Ceratopteris*) ferns with solenostelic or dictyostelic scaly rhizomes. *Stipes* not articulated, with U-shaped or variously dissected vascular strands, often dark coloured and nitid. *Lamina* 1- to 4-pinnate; *veins* free or anastomosing. *Sori* discrete or fusing along an intramarginal vein or set along veins or on the under surface of special soral flaps (*Adiantum*) or acrostichoid (*Acrostichum*), submarginal or superficial. *Sporangia* long- or short-stalked, often mixed with paraphyses. *Spores* trilete, with perispore.

- 1a Sori covering whole under surface or borne along veins:
  - 2a Sori covering under surface of fertile pinnae..... 1. *Acrostichum*
  - 2b Sori borne along veins:
    - 3a Lamina with orange, yellow or white powder on under surface..... 4. *Pityrogramma*
    - 3b Lamina without powder on under surface:
      - 4a Segments of fertile lamina obovate-cuneate, incised; plant terrestrial; fronds membranous, uniform..... 2. *Anogramma*
      - 4b Segments of fertile lamina narrowly linear; plant aquatic; fronds succulent, dimorphous..... 3. *Ceratopteris*
- 1b Sori marginal or submarginal:
  - 5a Sori borne on reflexed marginal flaps..... 5. *Adiantum*
  - 5b Sori borne on under surface of lamina near margin and usually covered by it:
    - 6a Fronds pinnately divided:
      - 7a Ultimate fertile segments with a distinct entire to serrate sterile apex ..... 6. *Pteris*
      - 7b Ultimate fertile segments without a distinct sterile apex:
        - 8a Ultimate segments of frond not articulated..... 7. *Cheilanthes*
        - 8b Ultimate segments of frond articulated ..... 8. *Pellaea*
    - 6b Fronds dichotomously flabellate ..... 9. *Actiniopteris*

## 1. ACROSTICHUM

*Acrostichum* L., Sp. Pl. 2: 1067 (1753); Gen. Pl. edn 5: 484 (1754), as *Acrosticum*; Engl., Pflanzenw. Afr. 2: 58 (1908); Tardieu-Blot in Mém. Inst. fr. Afr. noire 28: 86 (1953); in Fl. Madag. 5, 1: 108 (1958); Alston in F.W.T.A. edn 2, Suppl. 36 (1959); Tardieu-Blot in Fl. Gabon 8: 99 (1964); in Fl. Camer. 3: 130 (1964); Schelpe in F.Z. Pterid.: 98 (1970); in C.F.A. Pterid.: 80 (1977). Type species: *A. aureum* L.

Rhizome erect to procumbent, massive, with thick fleshy roots and set with large tough rhizome-scales. *Fronds* large, tufted; *lamina* large, simply pinnate; *pinnae* petiolate, entire, coriaceous; *veins* anastomosing freely, without included veinlets. *Sori* borne on under surface of undifferentiated apical pinnae, acrostichoid, with paraphyses.

A genus of about 5 species along tropical and subtropical coasts, usually on the landward margin of mangrove swamps. One species occurs in Southern Africa.

*Acrostichum aureum* L., Sp. Pl. 2: 1069 (1753); Sim, Ferns S. Afr. edn 2: 292, t. 153 (1915); Schelpe in F.Z. Pterid.: 99, t. 31 (1970); in C.F.A. Pterid.: 80, t. 14 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 219, t. 8, 72 (1983). Type: Hort. Cliff. Sicc. (BM, lecto.!).

*Chrysodium aureum* (L.) Mett., Fil. Lips. 21 (1856).

*Chrysodium vulgare* Fée, Mém. Fam. Foug. 2: 97 (1845), nom. illeg.

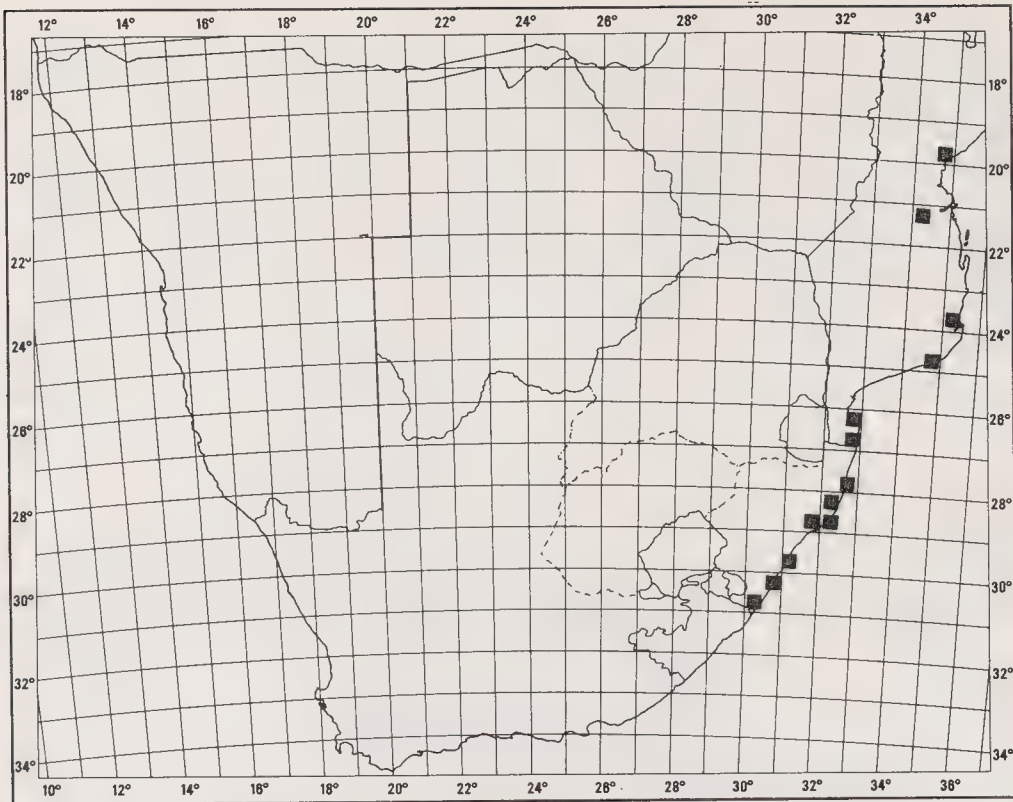
Rhizome c. 6 mm in diameter, set with hard subulate rhizome-scales c. 10 mm long, with thick black median area and pale narrow clathrate borders. *Fronds* erect; *stipe* brown, shallowly sulcate, up to 0.5 m long; *lamina* up to 1.5 × 0.4 m; *sterile pinnae* glabrous, linear to cultrate, entire to irregularly undulate, acuminate to truncate, 80–360 × 10–50 mm, base unequally cuneate; costa raised and prominent below, reticulate venation apparent; *fertile pinnae* borne towards apex of frond, similar to





HERRAT MARCH





MAP 71.—*Acrostichum aureum*

sterile pinnae but with under surface (except costa) covered with sporangia. Fig. 26.

Pantropical. Natal to Mozambique, Angola, Zaire, Sierra Leone, Liberia, Ivory Coast, Ghana, Nigeria, Cameroun, Equatorial Guinea, Angola, São Tomé and Príncipe, Zanzibar, Madagascar and Mauritius. In Southern Africa *A. aureum* is known from a few tidal estuaries along the Zululand and Mozambique coasts, near sea level. Map 71.

Vouchers: *Buchanan* s.n. (BOL; NH); *Fisher* 1020 (BLFU; BM; BOL; NH; NU; PRE).

## 2. ANOGRAMMA

**Anogramma** Link, Fil. Sp. 137 (1841); Tardieu-Blot in Fl. Madag. 5, 1: 120 (1958); Pichi-Sermolli in Webbia 21: 496 (1966); Launert in F.S.W.A. 5: 1 (1969); Schelpe in F.Z. Pterid.: 99 (1970); in C.F.A. Pterid.: 80 (1977). Lectotype species: *A. leptophylla* (L.) Link (= *Polypodium leptophyllum* L.).

Rhizome very small, possibly produced annually from a persistent relatively large gametophyte, set with small brown scales. *Stipe* dark brown, glabrous. *Lamina* 2- to 3-pinnate with incised decurrent pinnules, glabrous to thinly pubescent, membranous; *veins* free. *Sori* borne along the forked veins, exindusiate.

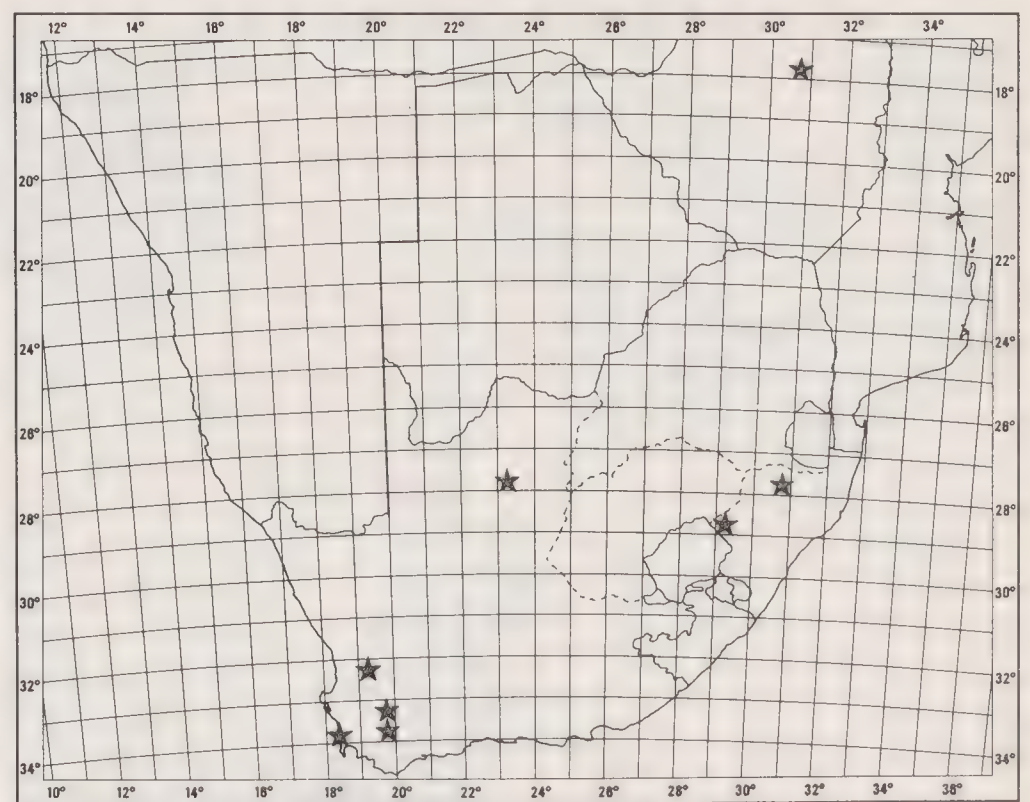
A genus of about 5 species, only one occurring in Africa.

**Anogramma leptophylla** (L.) Link, Fil. Sp. 137 (1841); Sim, Ferns S. Afr. edn 2: 193, t. 109 (1915); Schelpe in Contr. Bolus Herb. 1: 47 (1969); Launert in F.S.W.A. 5: 1 (1969); Schelpe in F.Z. Pterid.: 99, t. 32 (1970); in C.F.A. Pterid.: 80 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 220, t. 154 (1983). Type: South Europe, Herb. Tournefort no. 5337 (P, lecto.).

*Polypodium leptophyllum* L., Sp. Pl. 2: 1092 (1753). *Asplenium leptophyllum* (L.) Swartz, Obs. Bot. 403 (1791). *Osmunda leptophylla* (L.) Savi in Lam., Encycl. 4: 657 (1797). *Acrostichum leptophyllum* (L.) Lam. et D.C., Fl. franc. 2: 565 (1805). *Grammitis leptophylla* (L.) Swartz, Syn. Fil. 23, 218, t. 1 fig. 6 (1806). *Gymnogramma leptophylla* (L.) Desv. in Ges. naturf. Berl. Mag. 5: 305 (1811). *Hemionitis leptophylla* (L.) Lagasca, Gen. & Sp. Pl. 33 (1816). *Dicranodium leptophyllum* (L.) Newm., Hist. Brit. Ferns edn 3: 13 (1854). *Pityrogramma leptophylla* (L.) Domin in Publs Fac. Sci. Univ. Charles. 88: 9 (1928).

Rhizome minute, annual, set with minute, pale, linear, entire rhizome-scales c. 1 mm

long. *Fronde* few, tufted erect, herbaceous; *stipe* castaneous, up to 80 mm long, glabrous



MAP 72.—*Anogramma leptophylla*

FIG. 26.—1, *Acrostichum aureum*, upper surface of part of frond,  $\times 0,6$  (Schelpe 4433); 1a, lower surface of part of frond,  $\times 0,6$  (Fisher 1020).







except for a few small pale scales basally; *lamina* oblong-ovate to narrowly deltate, up to 70 × 28 mm, 2- to 3-pinnatifid (rarely pinnate in very small plants); *pinnae* ovate-deltate; *ultimate segments* broadly to narrowly cuneate, emarginate or shallowly lobed, glabrous on both surfaces, bearing the sori; *rhachis* castaneous to stramineous, glabrous, narrowly winged in upper part. Fig. 27: 3.

Widespread in the New and Old Worlds. Cape Province, Natal and Zimbabwe, Kenya, Uganda, Tanzania, Zaire, Cameroun, Algeria, Sudan and Ethiopia, as well as Canary Islands, Azores, Madeira, S. Europe, Turkey, Nepal, Sri Lanka, Java, Brazil, W. Australia and S. New Zealand. Shaded earth banks, c. 150–2 600 m. Map 72.

Vouchers: *Esterhuysen* 26244 (BM; BOL); *Johnstone* 313 (BM; NU); *Schelte* 4535 (BM; BOL).

*A. leptophylla* is frequently mistaken for the sporelings of other ferns.

### 3. CERATOPTERIS

***Ceratopteris* Brongn.** in Bull. Sci. Soc. Philom. 1821: 186 (1822); Engl., Pflanzenw. Afr. 2: 60 (1908); Tardieu-Blot in Fl. Madag. 6: 1 (1952); in Mém. Inst. fr. Afr. noire 28: 31 (1953); Pichi-Sermolli in Webbia 12: 647 (1957); Alston in F.W.T.A. edn 2, Suppl. 36 (1959); Tardieu-Blot in Fl. Gabon 8: 98 (1964); in Fl. Camer. 3: 129 (1964); Schelte in F.Z. Pterid.: 102 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 51 (1973); in C.F.A. Pterid.: 82 (1977). Lectotype species: *C. thalictroides* (L.) Brongn. (= *Acrostichum thalictroides* L.).

Aquatic or marsh ferns with short erect rhizomes and sparse brown rhizome-scales. *Fronds* tufted, dimorphous; *stipes* green, succulent, with numerous vascular strands; *fertile fronds* larger and more dissected bearing much narrower linear segments than sterile fronds, often proliferous; *veins* anastomosing, without included veinlets. *Sporangia* sessile, borne along veins, protected by reflexed margin of ultimate segments; *spores* trilete.

A genus of c. 5 species occurring throughout the tropics, with possibly 2 recognisable species in Africa. This genus has been placed by some authors in a separate monogeneric family, the Parkeriaceae.

***Ceratopteris thalictroides* (L.) Brongn.** in Bull. Sci. Soc. Philom. 1821: 186 (1821); Sim, Ferns S. Afr. edn 2: 294, t. 109 fig. 3 (1915); Schelte in Contr. Bolus Herb. 1: 46 (1969); in F.Z. Pterid.: 102 t. 34 (1970); in C.F.A. Pterid.: 82, t. 15 (1977). Type: Sri Lanka, Herb. Hermann vol. 3 no. 42 (BM, holo.).

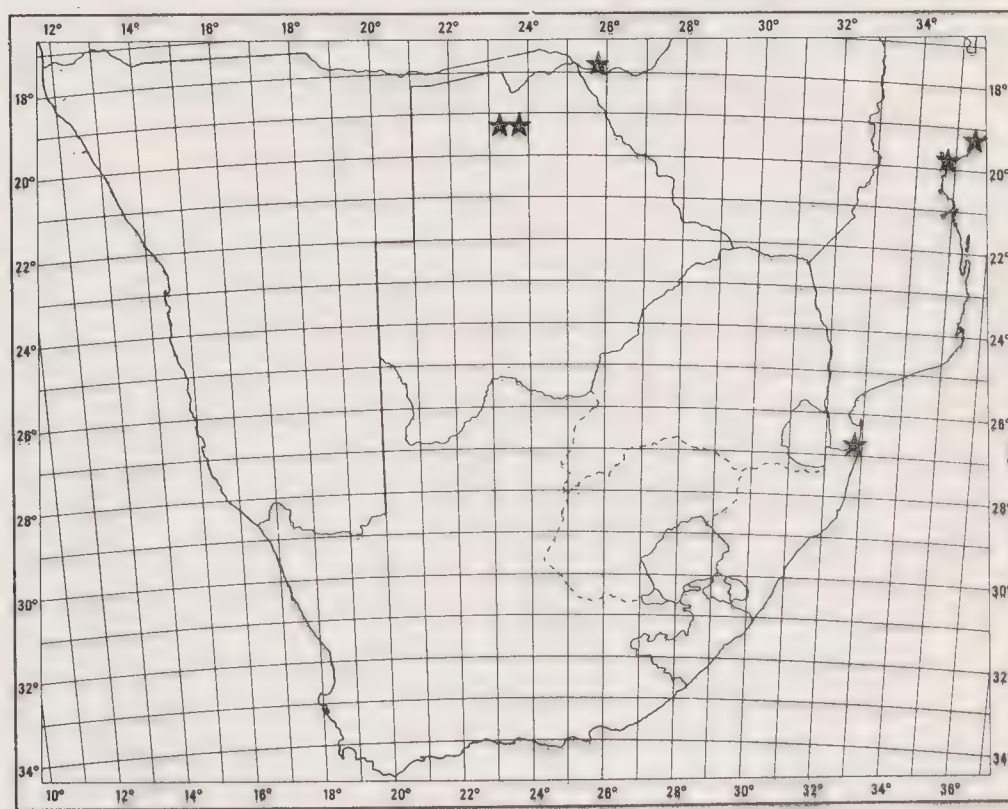
*Acrostichum thalictroides* L., Sp. Pl. 2: 1070 (1753). *Pteris thalictroides* (L.) Swartz in J. Bot., Gött. 1800, 2: 65 (1801). *Furcaria thalictroides* (L.) Desv. in Mém. Soc. Linn., Paris 6: 292 (1827).

*Ceratopteris cornuta* sensu W. B. G. Jacobsen, Ferns Sthn Afr. 218, t. 153 (1983).

Rhizome c. 5 mm in diameter. *Fronds* erect to arching, succulent, brittle; *stipe* succulent, brittle when fresh, eventually glabrous, up to 160 mm long; *sterile lamina* oblong, ovate or narrowly deltate, up to 200 × 70 mm, usually 2-pinnatifid into acute to obtuse deltate or lanceolate lobes, glabrous on both surfaces; *fertile lamina* narrowly to broadly ovate, up to 240 × 120 mm, usually 3-pinnatifid into narrowly linear acute lobes up to 40 × 1–1.5 mm, glabrous on both surfaces. *Sporangia* borne sparsely along veins. Fig. 28.

Widespread throughout tropical Africa and Asia. Botswana, Angola, Zimbabwe, Zambia, Mozambique, Zaire, Uganda, Tanzania, Sudan, Madagascar, Zanzibar, Socotra and Seychelles. Aquatic or rooted in mud in sluggish streams and marshes, from near sea level to 780 m. Map 73.

Vouchers: *Gibbs Russell & Biegel* 1547 (BOL; SRGH); *Smith* 1337 (BOL; SRGH).



MAP 73.—*Ceratopteris thalictroides*

FIG. 27.—1, *Pityrogramma calomelanos* var. *aureoflava*, part of plant, × 0.6; 1a, detail of lower surface of pinnules, × 3.6 (*Schelte* 5068). 2, *Pityrogramma argentea*, part of plant, × 0.6; 2a, detail of lower surface of ultimate segments, × 3.6 (*Schweickerdt* 2429). 3, *Anogramma leptophylla*, part of plant, × 0.6 (*Schelte* 4535).





FIG. 28.—*Ceratopteris thalictroides*, part of plant,  $\times 0,6$  (*Repart. de Agric.* 813).



# 4. PITYROGRAMMA

**Pityrogramma** Link, Handb. Gewächse. 3: 19 (1833); Tardieu-Blot in Mém. Inst. fr. Afr. noire 28: 206 (1953); in Fl. Madag. 5, 1: 117 (1958); Alston in F.W.T.A. edn 2, Suppl. 38 (1959); Tardieu-Blot in Fl. Gabon 8: 102 (1964); in Fl. Camer. 3: 132 (1964); Schelpe in F.Z. Pterid.: 105 (1970); in C.F.A. Pterid.: 82 (1977). Type species: *P. chrysophylla* (Swartz) Link (= *Acrostichum chrysophyllum* Swartz).

Rhizome erect or creeping, set with linear, attenuate, concolorous brown rhizome-scales. *Fronds* tufted; *stipe* castaneous, glabrous except for a few scales basally; *lamina* 2- to 4-pinnatifid, membranous to thinly coriaceous, with white, pink, yellow or orange powder on under surface, glabrous ventrally; *veins* free. *Sori* borne along the length of the veins, exindusiate.

A genus of 14 species, most of which occur in tropical America (Tryon, 1962).

Fronds broadly deltate, brittle; ultimate segments obtuse.....1. *P. argentea*

Fronds oblong-lanceolate, robust; ultimate segments acute-acuminate ..... 2. *P. calomelanos* var. *aureoflava*

1. **Pityrogramma argentea** (Willd.) Domin in Publ. Fac. Sci. Univ. Charles. 88: 6 (1928); Schelpe in Contr. Bolus Herb. 1: 49 (1969); in F.Z. Pterid.: 105, t. 35 (1970); in C.F.A. Pterid.: 84, t. 16 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 221, t. 24, 155 (1983). Type: Réunion, Bory s.n., Herb. Willdenow no. 19569 (B, holo.).

*Hemionitis argentea* Willd. in L., Sp. Pl. edn 4, 5: 132 (1810). *Gymnogramma argentea* (Willd.) Mett. ex Kuhn, Fil. Afr. 59 (1868); Sim, Ferns S. Afr. edn. 2: 194, t. 87 (1915). *Ceropteris argentea* (Willd.) Kuhn in Von Deck., Reisen, Bot. 3, 3: 18 (1879).

*Gymnogramma thiebautii* Desv. in Mém. Soc. Linn., Paris 6: 215 (1827), nom. illeg.

*Gymnogramma conspersa* Kunze in Linnaea 18: 116 (1844). *Anogramma conspersa* (Kunze) Fée, Mém. Fam. Foug. 5: 184 (1852). Type: Natal, Gueinzius s.n. (LZ, holo.†; K!).

Rhizome erect, suberect to procumbent, c. 2 mm in diameter, set with entire rhizome-scales up to 2 mm long. *Fronds* tufted, arching, herbaceous, fragile; *stipe* castaneous, nitid, up to 150 mm long; *lamina* ovate-deltate, up to 210 × 160 mm, 3- to 4-pinnatifid, lowest pinnae ¼–½ as long as lamina; *pinnae* narrowly ovate-deltate, up to 120 mm long; *pinnules* of upper pinnae and *pinnule segments* of lower pinnae cuneate to broadly oblong-ovate, deeply pinnatifid into obtuse or emarginate, entire to crenate lobes c. 1 mm broad; *powder* white, pink or yellow; *rhachis* and *secondary rhachises* castaneous, the latter often narrowly winged for some distance from apex. *Sori* linear, up to 2 mm long. Fig. 27: 2.

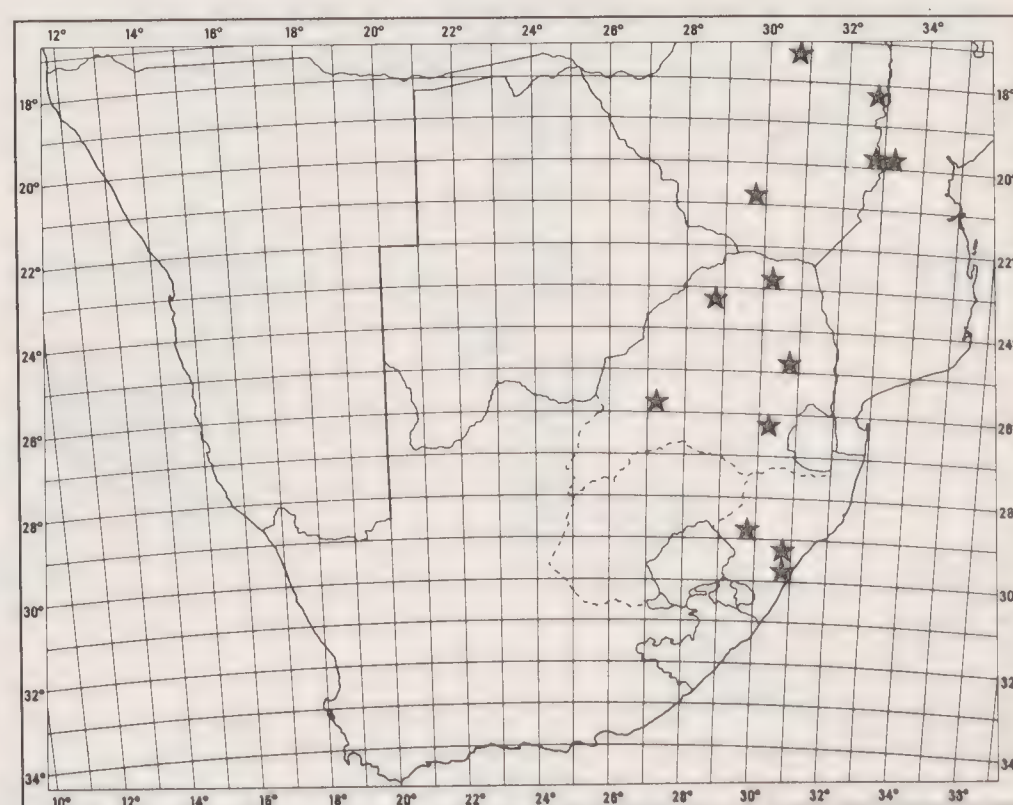
Natal and Transvaal, Zimbabwe, Mozambique, Malawi, Angola, Zaire, Madagascar and Réunion In rock crevices and around boulder bases, 1 200–2 500 m. Map 74.

Vouchers: Acocks 11439 (BOL; PRE); Esterhuysen 21473 (BOL); Schweickerdt 2430 (BOL).

2. **Pityrogramma calomelanos** (Swartz) Link, Handb. Gewächse 3: 20 (1833); Schelpe in J1 S. Afr. Bot. 30: 182 (1964); in Fern Gaz. 11: 101 (1975). Type: Tropical America (LINN 1245/19, holo.).

The typical variety does not occur in Southern Africa.

Var. **aereoflava** (Hook.) Weath. ex. Bailey, Man. Cult. Pl. 64 (1926); Schelpe in Fern Gaz. 11: 101 (1975); W. B. G. Jacobsen, Ferns Sthn Afr. 222, t. 7 (1983). Type: South America, Ecuador, Seemann 948 (K, lecto.).



MAP 74.—*Pityrogramma argentea*



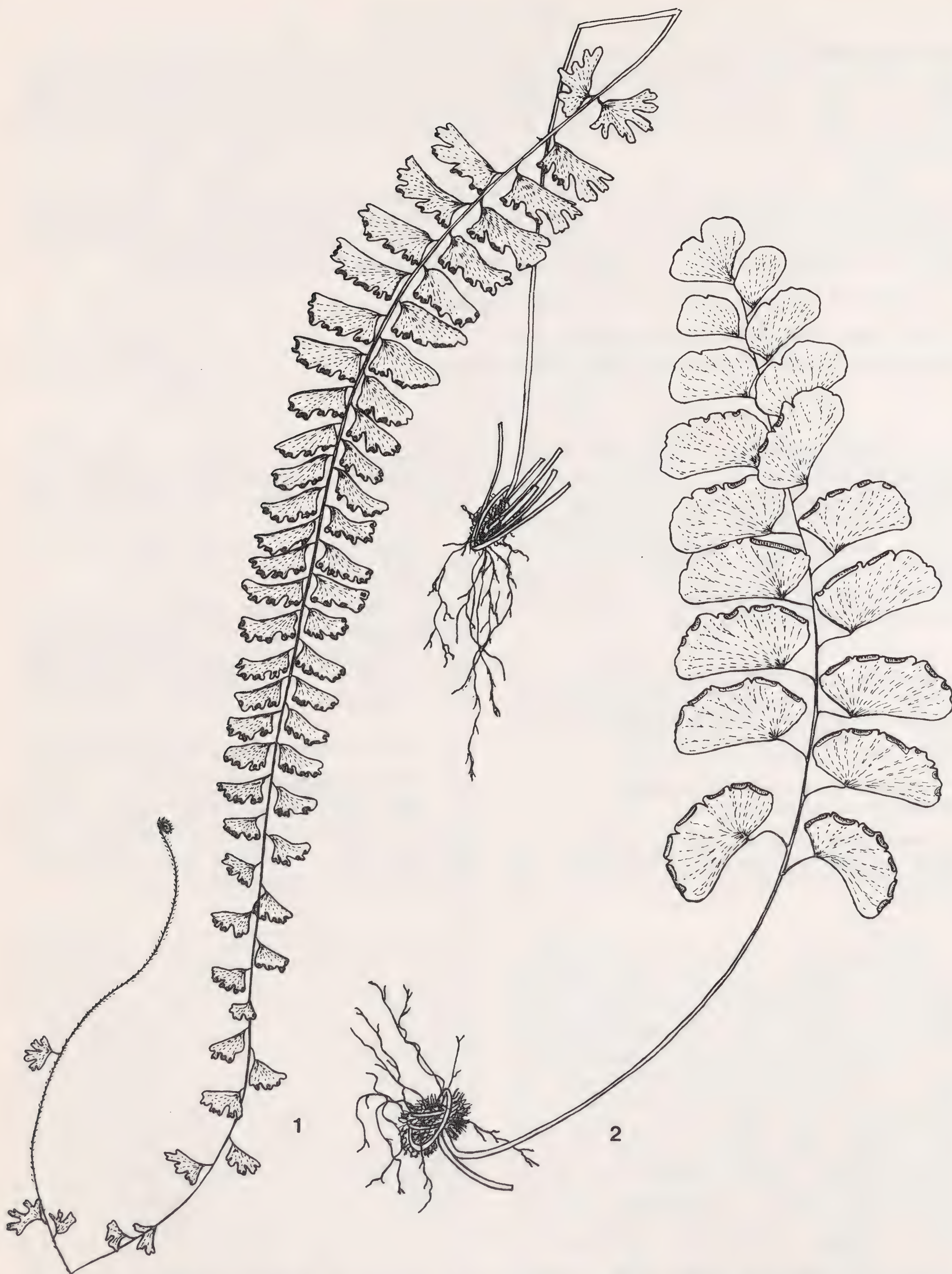
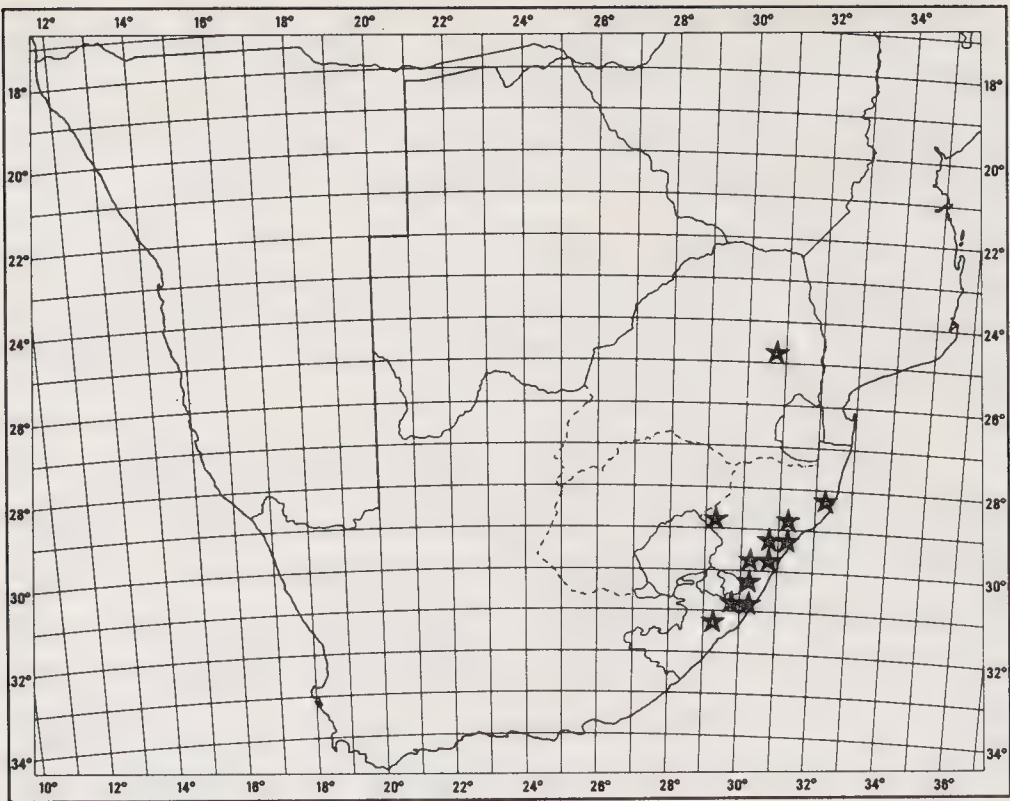


FIG. 29.—1, *Adiantum incisum*, part of plant,  $\times 0,6$  (Braithwaite 186). 2, *Adiantum philippense*, part of plant,  $\times 0,6$  (Mitchell 464).





MAP 75.—*Pityrogramma calomelanos* var. *aureoflava*

*Gymnogramma calomelanos* var. *aureoflava* Hook., Gdn Ferns t. 50 (1862).  
*Ceropteris calomelanos* sensu Sim, Ferns S.Afr. edn 2: 196, t. 88 (1915).

Rhizome short, procumbent, c. 8 mm in diameter, set with concolorous light brown, entire, linear rhizome-scales up to 4 mm long. *Fron*ds tufted, erect to arching, firmly herbaceous to thinly coriaceous; *stipe* atrocastaneous, nitid, up to 330 mm long; *lamina* oblong-lanceolate in outline, up to 370 × 140 mm, 2-pinnate to 3-pinnatifid, lowest pinnae not reduced; *pinnae* lanceolate, acute-acuminate, up to 90 × 22 mm; *pinna segments* oblong-trapeziform, the larger slightly auriculate, serrate (apparently entire if margin involute), acute, acuminate, up to 17 × 5 mm, set at acute angle to costa; *powder* yellow; *rhachis* atrocastaneous. *Sori* up to 3 mm long. Fig. 27: 1.

*P. calomelanos* was introduced from tropical America and is a common weed in the moist tropics. This variety was introduced from higher elevations than the typical variety in South America and has become naturalised on road and railway embankments in Transkei, Natal and Transvaal, on Mauritius and Comoro Islands, as well as Australia; from near sea level to 1 700 m in Southern Africa. Map 75.

Vouchers: *Davidson* 3017 (BOL; J); *Moll* 2272 (BOL; NU).

5. ADIANTUM

*Adiantum* L., Sp. Pl. 1094 (1753); Gen. Pl. edn 5: 485 (1754); Engl., Pflanzenw. Afr. 2: 42 (1908); Tardieu-Blot in Mém. Inst. fr. Afr. noire 28: 93 (1953); in Fl. Madag. 5, 1: 122 (1958); Alston in F.W.T.A. edn 2, Suppl. 38 (1959); Tardieu-Blot in Fl. Gabon 8: 106 (1964); in Fl. Camer. 3: 143 (1964); Launert in F.S.W.A. 6: 1 (1969); Schelpe in F.Z. Pretid.: 108 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 53 (1973); in C.F.A. Pterid.: 85 (1977). Type species: *A. capillus-veneris* L.

Rhizome erect or shortly or widely creeping, set with brown rhizome-scales. *Fron*ds tufted or spaced; *stipe* dark brown or black, nitid; *lamina* simply pinnate to 4-pinnate, with flabellate, dimidiate or cuneate segments, glabrous or pilose, or occasionally with hellow powder on under surface; *veins* free. *Sori* borne on inner surface of marginal reflexed lobes which protect the developing sporangia.

A cosmopolitan genus of over 200 species with a large proportion in South America.

- 1a *Fron*ds simply pinnate:
  - 2a *Lamina* pilose ..... 1. *A. incisum*
  - 2b *Lamina* glabrous.....2. *A. philippense*
- 1b *Fron*ds 2- to 4-pinnate:
  - 3a *Fron*ds repeatedly and unequally dichotomously divided ..... 3. *A. hispidulum*
  - 3b *Fron*ds pinnately divided:
    - 4a *Veins* of sterile pinnules ending in the marginal teeth:
      - 5a *Sori* orbicular to semiorbicular .....4. *A. aethiopicum*
      - 5b *Sori* oblong to lunate ..... 5. *A. capillus-veneris*
    - 4b *Veins* of sterile pinnules ending in sinuses between marginal teeth or crenations of teeth:
      - 6a *Sori* lunate; ultimate segments articulated, eventually deciduous.....6. *A. poiiretii*
      - 6b *Sori* suborbicular; ultimate segments not articulated, persistent ..... 7. *A. raddianum*



1. ***Adiantum incisum* Forssk.**, Fl. Aegypt.-Arab. cxxv, 187 (1775); Schelpe in Contr. Bolus Herb. 1: 52 (1969); in F.Z. Pterid.: 108, t. 36C (1970); in C.F.A. Pterid.: 85 03004613(1977); W. B. G. Jacobsen, Ferns Sthn Afr. 223, t. 156 (1983). Type: Yemen, Hadie, Herb. Forsskal no. 813 (C, holo.).

*Adiantum caudatum* sensu Sim, Ferns S. Afr. edn 2: 241, t. 118 fig. 2 (1915).

Rhizome short, erect, set with subulate rhizome-scales c. 4 mm long. *Fronds* tufted, arching, membranous, often proliferous at apex of a naked extension of rachis; *stipe* castaneous to black, up to 90 mm long, set with numerous brown hairs; *lamina* linear to cultrate, up to 260 × 40 mm, pinnate, attenuate; *pinnae* mostly oblong, but reduced and obtuse towards apex of frond, up to 20 × 10 mm, shortly petiolate, incised irregularly on acroscopic margin into mostly emarginate lobes, thinly set on both surfaces with pale brown multicellular hairs c. 1.3 mm long. *Sori* borne at apices of pinna lobes; *indusial flaps* lunate to oblong, glabrous to thinly pilose. Fig. 29: 1.

Widespread in tropical Africa. South West Africa/Namibia, Transvaal, Zimbabwe, Mozambique, Malawi, Zambia, Kenya, Uganda, Tanzania, Zaire, Ethiopia, Sudan, Ghana, Nigeria, Angola, Comoro Islands, Yemen and India. Around boulders in forest, 500–2 000 m. Map 76.

Vouchers: *Dinter* 5707 (BOL; NH; PRE); *Galpin* 1244 (NH; PRE; SAM); *Schelpe* 4281 (BM; BOL).

2. ***Adiantum philippense* L.**, Sp. Pl. 2: 1094 (1753); Schelpe in Contr. Bolus Herb. 1: 54 (1969); in F.Z. Pterid.: 110, t. 36G (1970); in C.F.A. Pterid.: 87 (1977); W. B. G. Jacob-

sen, Ferns Sthn Afr. 225, t. 158 (1983). Iconotype: Petiver, Gazophylacium, Decas 1: t.4 fig. 4 (1702)!, from the Philippine Islands. Probable holotype: Luzon, Herb. Sloane 163 (BM).

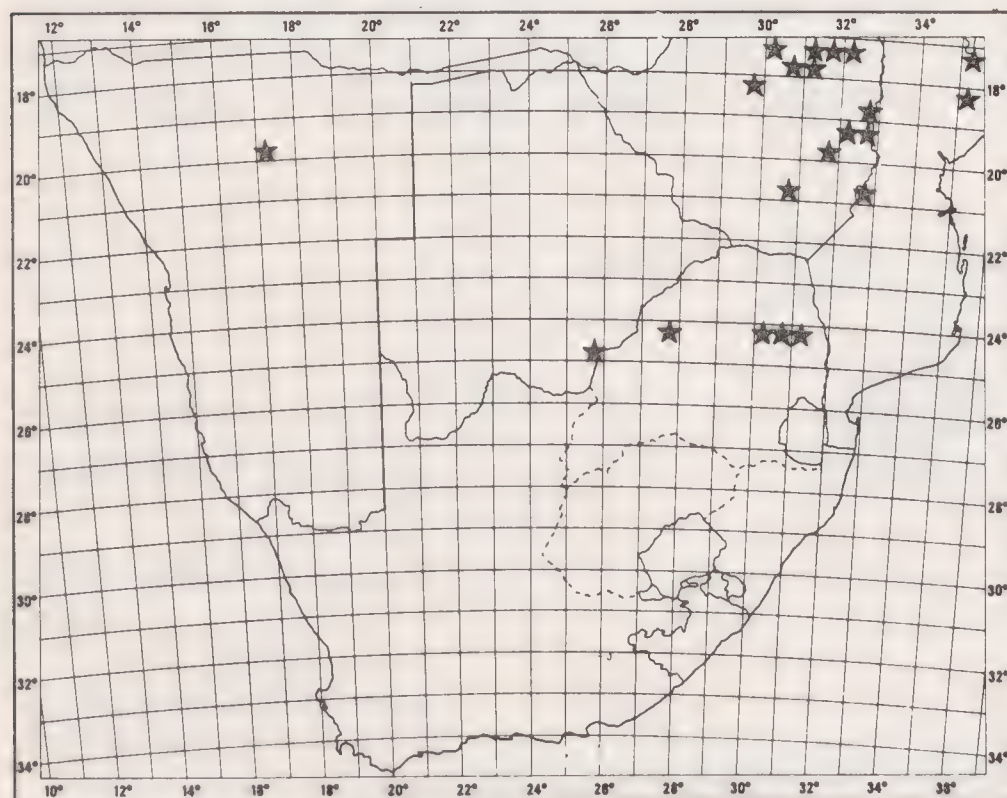
*Adiantum lunulatum* Burm. f., Fl. Ind. 235 (1768); Sim, Ferns S. Afr. edn 2: 243, t. 119 (1915). *Pteris lunulata* (Burm. f.) Retz., Obs. Bot. 2: 28, t. 4 (1781). Type: India, Herb. Burmann (G, holo.).

Rhizome short, suberect or creeping, set with subulate rhizome-scales c. 3 mm long. *Fronds* tufted, arching, herbaceous, often proliferous apically; *stipe* castaneous, glabrous, up to 150 mm long; *lamina* linear-lanceolate, up to 420 × 95 mm, pinnate; *pinnae* mostly very broadly oblong to rhombic, more reduced and obtuse towards apex of frond, up to 20 × 46 mm, borne on slender castaneous petioles up to 18 mm long, shallowly incised along acroscopic margin into truncate lobes, glabrous on both surfaces. *Sori* borne on apices of pinna lobes; *indusial flaps* up to 20 mm long, linear to shallowly lunate, glabrous. Fig. 29: 2.

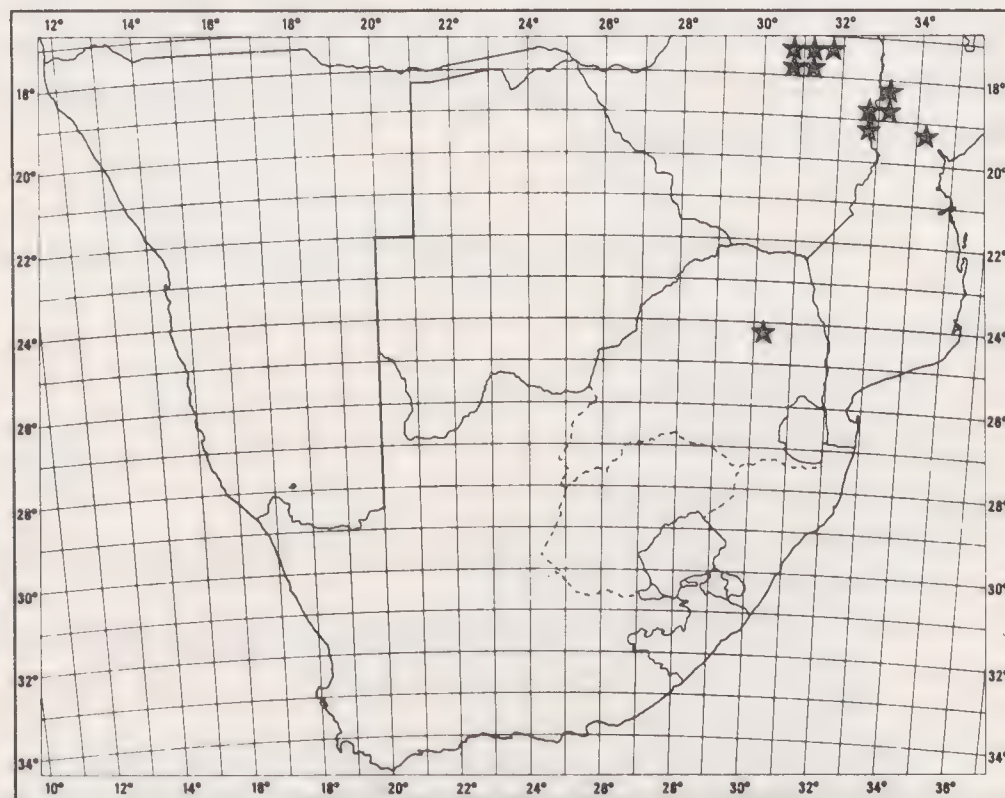
Paleotropical with a fragmentary distribution. In Africa from Transvaal, to Zimbabwe, Mozambique, Angola, Zambia, Malawi, Zaire, Burundi, Tanzania, Uganda, Madagascar, Comoro Islands, Sudan, Cameroun, Nigeria, Togo, Ghana, Liberia, Sierra Leone, Guinea and São Tomé. Also Senegal (Tardieu-Blot, 1964). On moist forest floor and earth banks, always in deep shade, 300–1 370 m. Map 77.

Voucher: *Leighton* 3245 (BOL).

3. ***Adiantum hispidulum* Swartz** in J. Bot., Gött. 1800, 2: 82 (1801); Sim, Ferns S. Afr. edn 2: 244 (1915); Schelpe in Contr. Bolus Herb. 1: 55 (1969); in F.Z. Pterid.: 111, t. 36A (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 228, t. 161 (1983). Type: Australasia (S, holo.).

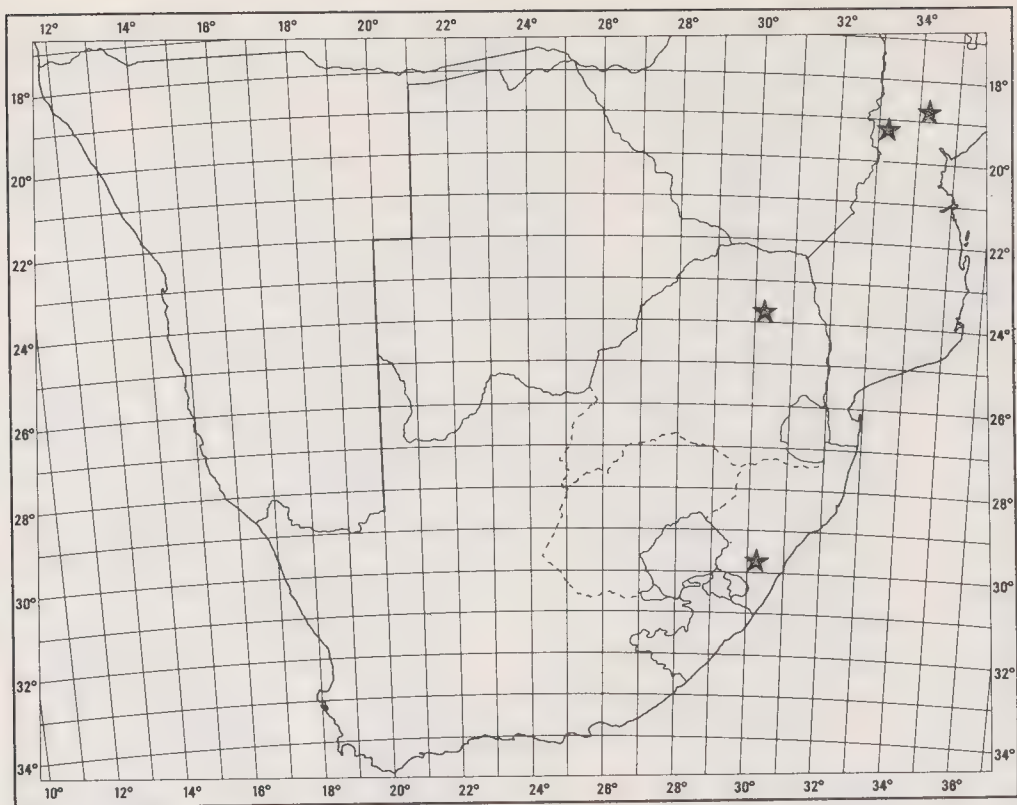


MAP 76.—*Adiantum incisum*



MAP 77.—*Adiantum philippense*



MAP 78.—*Adiantum hispidulum*

Rhizome short, erect to procumbent, set with castaneous, lanceolate, entire rhizome-scales up to 1,5 mm long. *Fronds* tufted, erect, pedate or repeatedly unequally dichotomously divided; *stipe* castaneous, hispid, up to 290 mm long; *lamina* approximately deltate, up to 240 × 200 mm, repeatedly dichotomously divided into up to 8 linear pinnae up to 200 mm long; *pinnules* mostly rhombic, becoming reduced and obcuneate towards pinna apex, firmly herbaceous, dark green, thinly hispid on under surface only, up to 10 × 6 mm; *rhachis* castaneous-hispid with pale stiff hairs up to 0,5 mm long. *Sori* borne on acroscopic and outer margin of pinnules; *indusial flaps* pilose, round to oblong, up to 1 mm in diameter.

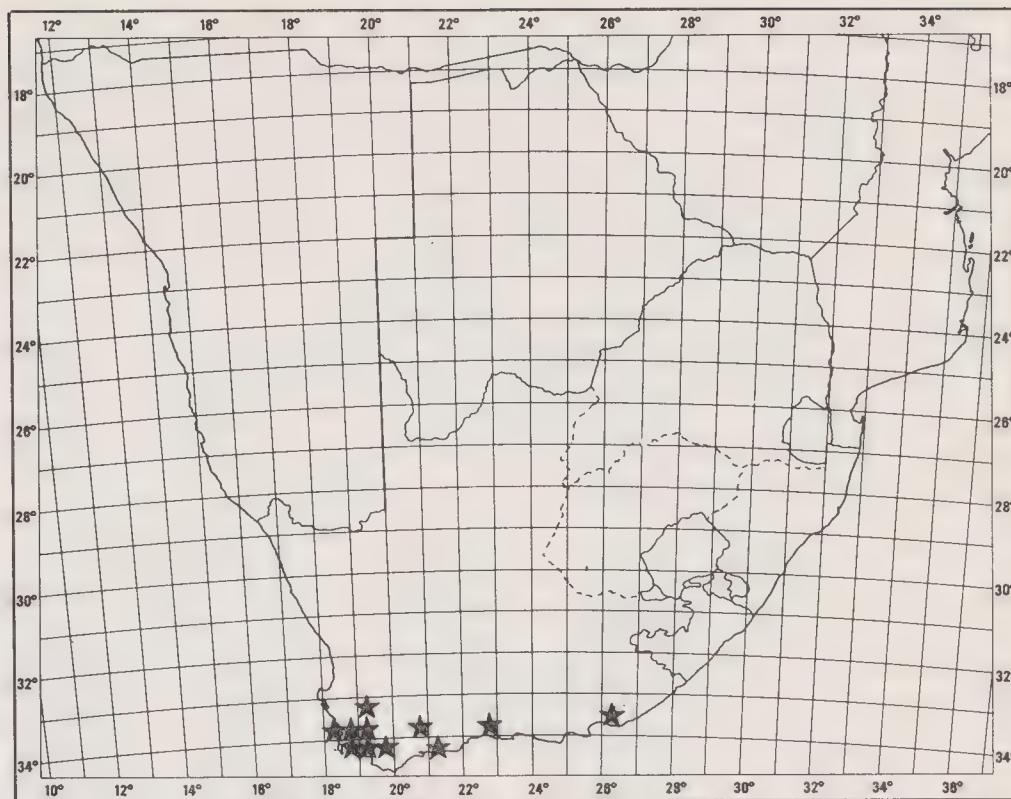
Sporadic throughout east tropical and temperate Africa, Asia and Australasia. Cape Province, Natal, Transvaal, Mozambique, Malawi, Kenya, Tanzania, Ethiopia, Comoro Islands, Mauritius, Rodrigues, Azores. Also S. India, Malesia, Polynesia and Australia. Confined to moist shaded habitats. In Natal it is recorded at an altitude of 830 m, where it may have escaped from cultivation. It has also been found naturalised in a few localised areas on the Cape Peninsula. Map 78.

Vouchers: Junod 4602 (PRE); Roux 177 (NBG); Tosh, Robinson & De Villiers 9 (K; NU).

**4. *Adiantum aethiopicum* L., Syst. Nat.** edn 10, 2: 1329 (1759); in *Sp. Pl.* edn 2: 1560 (1763); Schelpe in *Jl S. Afr. Bot.* 15: 43, t. 1a–c (1949); W. B. G. Jacobsen, *Ferns Sthn Afr.* 231, t. 164 (1983). Type: Cape Province (LINN 1252/15, holo.!).

*Adiantum poiretii* sensu Sim, *Ferns S. Afr.* edn 2: 247, t. 123 (1915).

Rhizome slender, widely creeping, set with squarrose, pale brown, lanceolate, entire

MAP 79.—*Adiantum aethiopicum*

rhizome-scales up to 2 mm long. *Fronds* spaced up to 80 mm apart, erect to arching; *stipe* castaneous, up to 90 mm long; *lamina* ovate, up to 200 × 150 mm, 3-pinnate; *pinnules* mostly cuneate to shortly rounded rhomboid, up to 13 × 14 mm, petiolate but not articulated, minutely dentate on outer margins, especially in sterile pinnules, with veins ending in the teeth; *rhachis* and *secondary rhachises* castaneous, glabrous. *Sori* 1–2 per pinnule, borne on outer margin; *indusial flaps* glabrous, orbicular to deeply reniform, c. 2 mm in diameter.

South-western Cape Province. On moist earth banks and streambanks in deep shade in forest at altitudes between 100 and 400 m. Map 79.

Vouchers: Compton 13475 (NBG; PRE); Esterhuysen 22238 (BOL).

**5. *Adiantum capillus-veneris* L., Sp. Pl.** 2: 1096 (1753); Sim, *Ferns S. Afr.* edn 2: 245, t. 121, 122 (1915); Schelpe in *Contr. Bolus Herb.* 1: 56 (1969); in *F.Z. Pterid.*: 112, t. 36D (1970); in *C.F.A. Pterid.*: 89 (1977); W. B. G. Jacobsen, *Ferns Sthn Afr.* 228, t. 14, 162 (1983). Type: S. Europe (LINN 1252/9, lecto.!).

*Adiantum marginatum* Schrad. in *Gött. Gel. Anz.* 1818: 918 (1818). Type: Cape Province, Hesse s.n. (LE, holo.—BOL, photo.!).

*Adiantum pseudocapillus* Fée, *Mém. Fam. Foug.* 5: 118 (1852), tom. cit. 7: 29, t. 1 (1857). Type: Cape of Good Hope, Drège s.n. (Holotype lost).

*Adiantum paradiseae* Bak. in *Gdnrs' Chron.*, ser. 3, 6: 558 (1889). Type: Cape Province, Bedford district, *Paradise* s.n. (K, holo.!, PRE!).

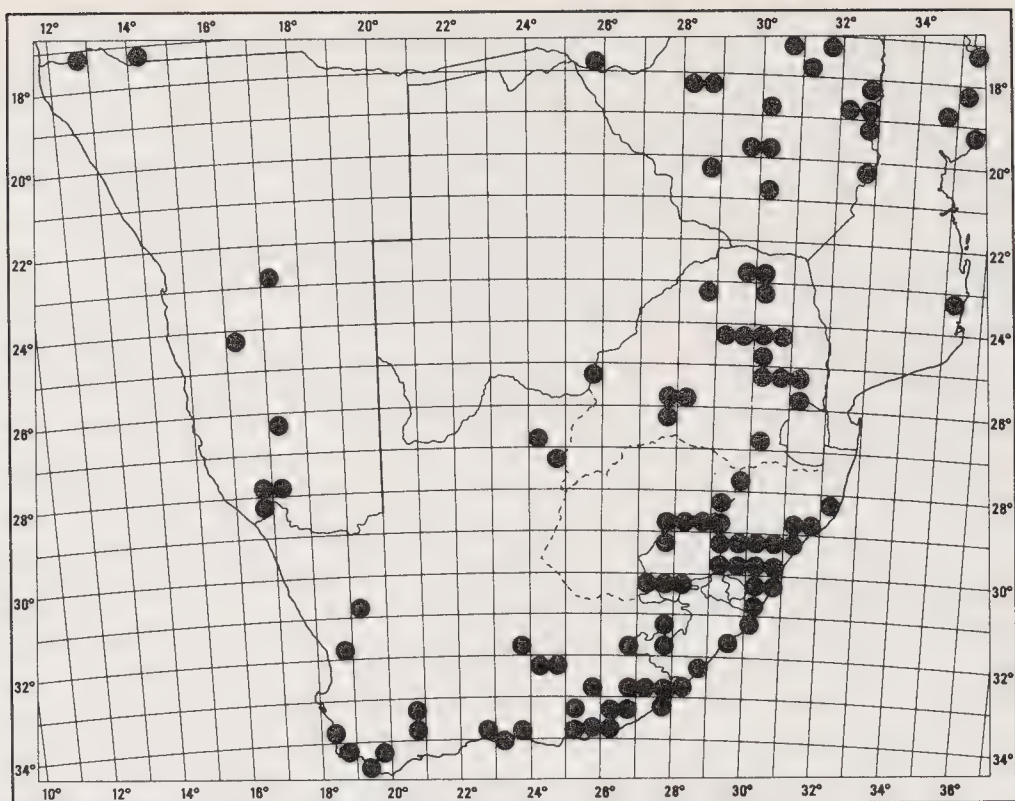
Rhizome creeping, set with subulate, reddish brown, entire rhizome-scales c. 3 mm





FIG. 30.—1, *Adiantum capillus-veneris*, part of plant,  $\times 0,6$ ; 1a, pinnule,  $\times 1,8$  (Van der Schijff 5486). 2, *Adiantum poiretii*, part of plant,  $\times 0,6$ ; 2a, pinnule,  $\times 1,8$  (Kluge 2246).



MAP 80.—*Adiantum capillus-veneris*

long. *Fronde*s spaced up to 10 mm apart, arching, herbaceous; *stipe* castaneous or ebeneous, glabrous; *lamina* usually narrowly ovate-deltate, up to 260 × 190 mm, 3-pinnate; *pinnules* cuneate, entire or irregularly shallowly to deeply lobed, petiolulate, minutely crenate-dentate on outer margin of sterile pinnules, veins ending in the teeth, glabrous on both surfaces, often glaucous green, thinly to firmly herbaceous, up to 27 × 20 mm; *rhachis* ebeneous, glabrous. *Sori* borne along outer margin of pinnules; *indusial flaps* lunate to oblong, glabrous, up to 5 × 1–1,5 mm. Fig. 30:1.

Cosmopolitan. Widespread in Southern Africa, Zimbabwe, Mozambique, Angola, Zambia, Malawi, Zaire, Kenya, Uganda, Tanzania, Ethiopia, Sudan, Egypt, Chad, Libya, Algeria, Morocco, Madeira, Cape Verde Islands, Madagascar, Mauritius and Comoro Islands. Shaded moist rock faces and crevices, often in semi-arid areas, 820–1 220 m. Map 80.

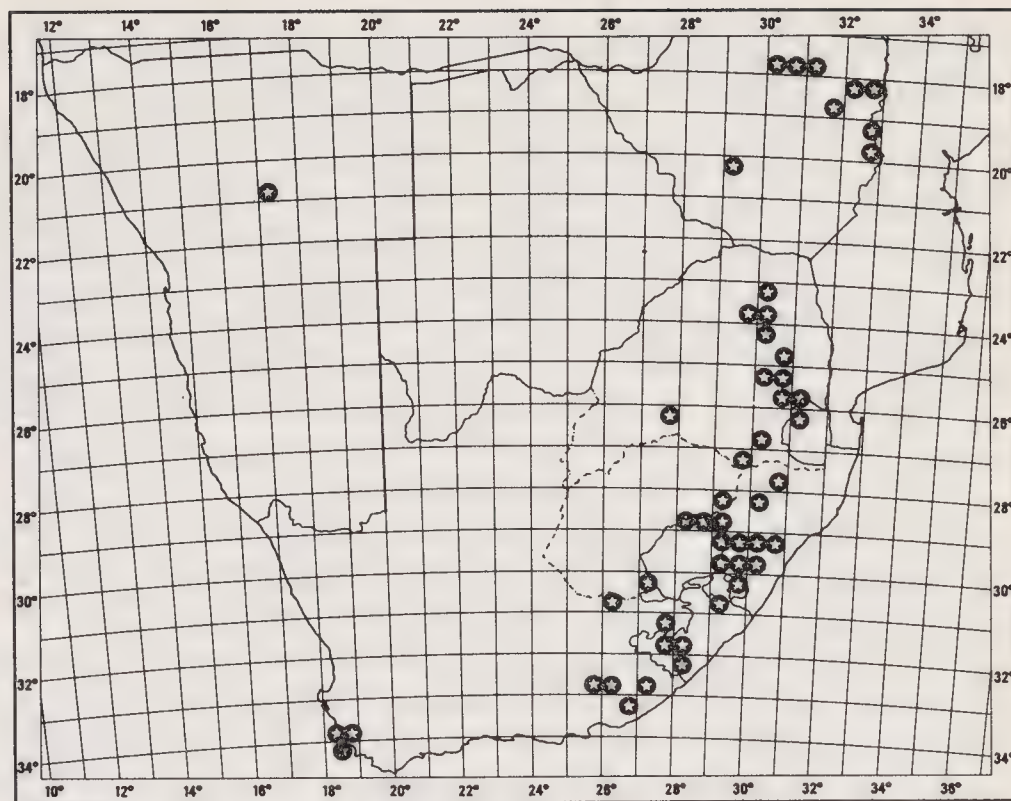
Vouchers: Dieterlen 694 (K; PRE; SAM); Esterhuysen 26257 (BM; BOL); Pott 4842 (BOL; PRE); Schelpe 5197 (BM; BOL); Strey 2001 (BOL; STE).

6. *Adiantum poiretii* Wikstr. in K. Svenska VetenskAkad. Handl. 1825: 443 (1826); Schelpe in Contr. Bolus Herb. 1: 56 (1969); in F.Z. Pterid.: 112, t. 36D (1970); in C.F.A. Pterid.: 89 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 230, t. 163 (1983). Type: Tristan da Cunha, *Thouars* s.n., Herb. Jussieu no. 1427 (P, holo.!—BOL, photo.!).

*Adiantum crenatum* Poir. in Lam., Encycl., Suppl. 1: 137 (Sept. 1810), non Willd. (March 1810).

*Adiantum aethiopicum* sensu Sim, Ferns S. Afr. edn 2: 248, t. 124 (1915), non L. (1759).

Rhizome slender, widely creeping, set with appressed, castaneous, lanceolate-acumi-

MAP 81.—*Adiantum poiretii*

nate, somewhat ciliate rhizome-scales c. 8 × 0,8 mm. *Fronde*s closely spaced, arching, thinly herbaceous; *stipe* castaneous, glabrous, up to 250 mm long; *lamina* broadly ovate-deltate, up to 450 × 330 mm, 3- to 4-pinnate; *pinnules* very broadly obcuneate to semicircular or shallowly reniform, up to 15 × 20 mm, articulated at apex of filiform petiolules, membranous, glabrous or with yellow powder below, deciduous with age leaving bare petiolules attached to secondary rhachises of old fronds; *rhachis* and *secondary rhachises* castaneous, glabrous. *Sori* borne along outer margin of pinnules; *indusial flaps* lunate, up to 2,5 mm long. Fig. 30: 2.

South West Africa/Namibia, Cape Province, Lesotho, north-eastern Orange Free State, Natal, Transvaal, Zimbabwe, Mozambique, Angola, Zambia, Malawi, Zaire, Kenya, Uganda, Tanzania, Burundi, Ethiopia, Sudan, Nigeria, Cameroun, Gough Island, Tristan da Cunha, Madagascar and Comoro Islands. Also India, Mexico and South America. Shaded floors of montane forest, 100–2 600 m. Map 81.

Vouchers: Pott 4841 (BOL; PRE); Wright, West & Acocks 26 (BOL; NH; PRE).

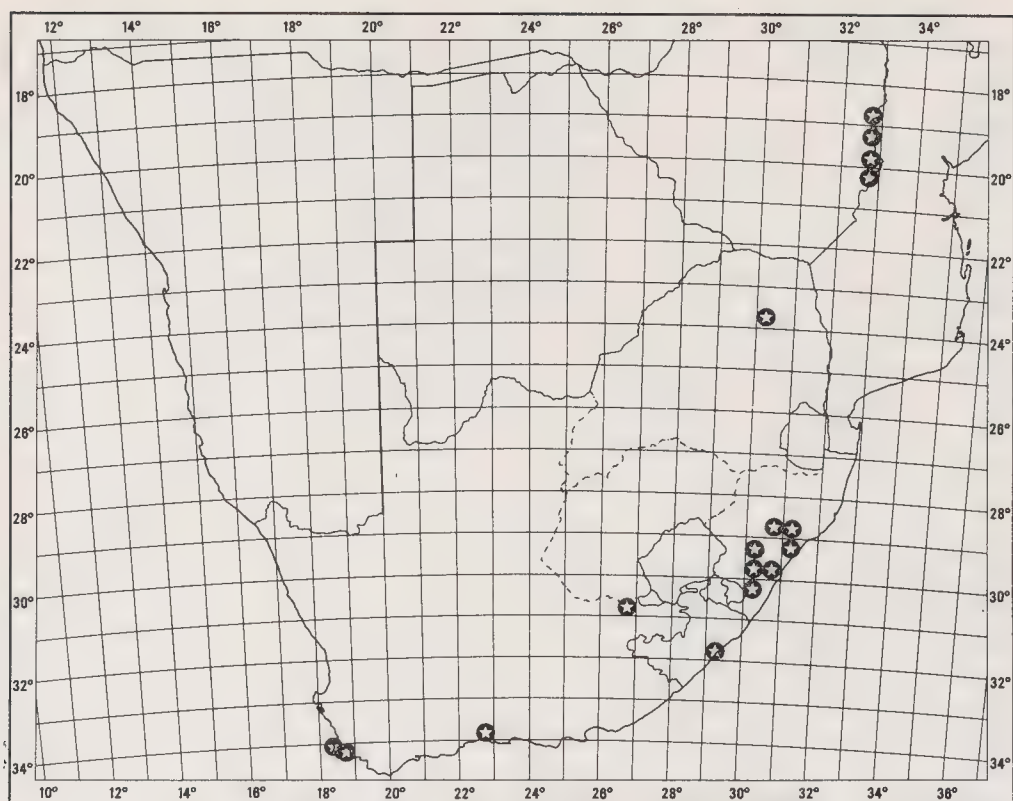
7. *Adiantum raddianum* Presl, Tent. Pterid. 158 (1836), reimpr. in Abh. K. Böhm. Ges. Wiss., ser. 4, 5: 158 (1837); Schelpe in Contr. Bolus Herb. 1: 57 (1969); in F.Z. Pterid.: 113 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 232, t. 165 (1983). Iconotype: Raddi, Pl. Brazil 1: t. 78 fig. 2 (1825)!

Rhizome slender, short, creeping, set with castaneous, broadly lanceolate, entire rhizome-scales up to 1,5 mm long. *Fronde*s tufted, arching, thinly herbaceous; *stipe* castaneous, glabrous, up to 300 mm long; *lamina* broadly ovate-deltate, up to 250 × 220 mm, 3- to 4-







MAP 82.—*Adiantum raddianum*

pinnate; *ultimate segments* obcuneate to trapeziform, up to  $11 \times 8$  mm, with filiform petioles, not articulated, outer margins minutely crenate-serrate, veins ending in sinuses, glabrous on both surfaces; *rhachis and secondary rhachises* castaneous, glabrous. *Sori* borne on outer margins of ultimate segments; *indusial flaps* subcircular to reniform, c. 1,5 mm in diameter.

Cape Province, Transkei, Natal, Transvaal, Zimbabwe, Mozambique, Malawi, Tanzania, São Tomé, St Helena, Mauritius and Ascension Island. A widely cultivated apogamous South American species which has escaped from cultivation in many tropical localities in Africa. In our area it has become naturalised on streambanks in forest between 150 and 1 310 m. Map 82.

Vouchers: *Schlieben* 7206 (K; PRE); *Smook* 559 (BOL; NU).

## 6. PTERIS

*Pteris* L., Sp. Pl. 1073 (1753); Gen. Pl. edn 5: 484 (1754); Engl., Pflanzenw. Afr. 2: 45 (1908); Tardieu-Blot in Mém. Inst. fr. Afr. noire 28: 68 (1953); in Fl. Madag. 5, 1: 82 (1958); Alston in F.W.T.A. edn 2, Suppl. 39 (1959); Tardieu-Blot in Fl. Gabon 8: 108 (1964); in Fl. Camer. 3: 152 (1964); Launert in F.S.W.A. 4: 2 (1969); Schelpe in F.Z. Pterid.: 115 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid. 59 (1973); in C.F.A. Pterid.: 90 (1977). Lectotype species: *P. longifolia* L.

Rhizome erect or shortly to widely creeping, dictyostelic, set with linear to ovate rhizome-scales sometimes with a dark central stripe. *Fronds* tufted to widely spaced; *lamina* thinly herbaceous to thinly coriaceous, glabrous, simply pinnate to 4-pinnatifid, *rhachis, costae and costules* sometimes spinous; *veins* free or anastomosing. *Sori* borne on an almost marginal vein, confluent into soral lines but not extending to apex of ultimate segments, covered by a continuous indusium formed from reflexed margin; paraphyses usually present.

A genus of over 250 species, mostly tropical but some in temperate regions also.

1a Upper pinnae simple (not pinnatifid), lower pinnae simple or with 1-3 basiscopic lobes:

2a Lower pinnae all simple, gradually reduced ..... 1. *P. vittata*

2b Lower pinnae with 1-2 basiscopic lobes ..... 2. *P. cretica*

1b Upper and lower pinnae pinnatifid to 3-pinnatifid:

3a Veins anastomosing at least in more broadly winged parts of costae; fronds widely spaced on a creeping rhizome; basal pinnae  $\pm$  as long as lamina ..... 3. *P. buchananii*

3b Veins free; fronds tufted on erect to procumbent rhizomes; basal pinnae shorter than lamina:

4a Sterile apices of fertile and sterile lobes crenate-dentate ..... 4. *P. dentata*

4b Sterile apices of fertile and sterile lobes entire or subentire:

5a Costules as well as costae spinous above ..... 5. *P. catoptera*

5b Only costae spinous above ..... 6. *P. friesii*

1. *Pteris vittata* L., Sp. Pl. 2: 1074 (1753); Schelpe in Contr. Bolus Herb. 1: 59 (1969); in F.Z. Pterid.: 115 (1970); in C.F.A. Pterid.: 90 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 235, t. 53, 167 (1983). Type: China, *Osbeck* s.n. (LINN 1246/3, holo.!).

*Pycnodoria vittata* (L.) Small, Ferns S. E. States 102: 468 (1938).

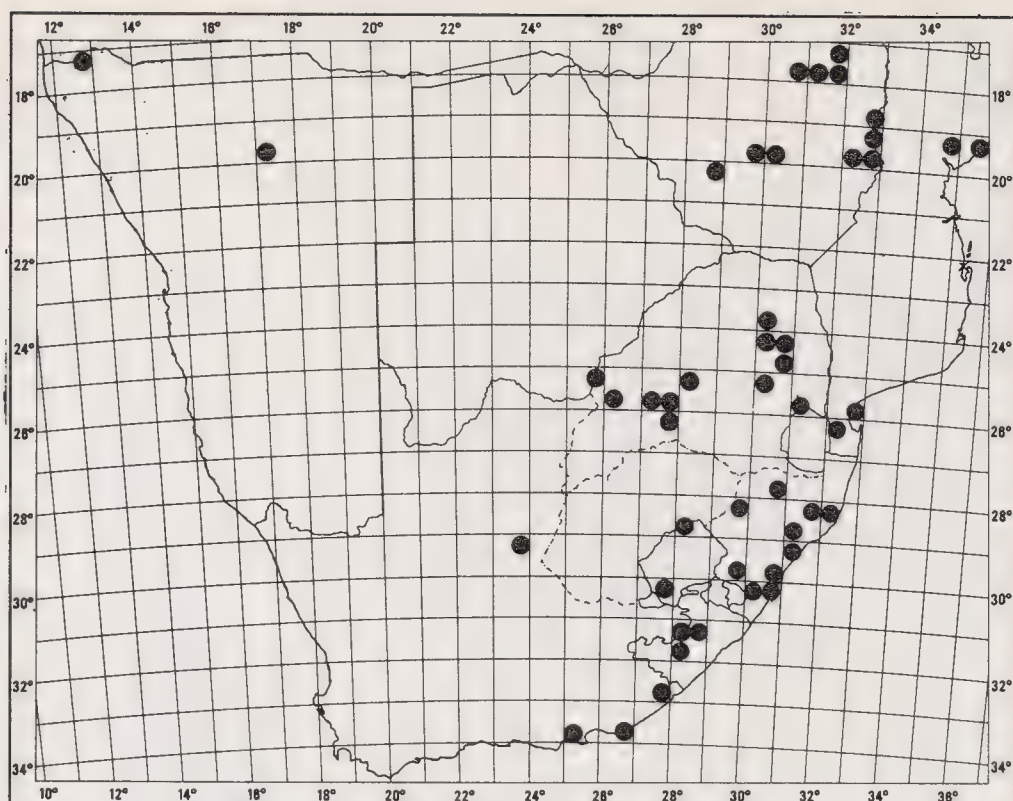
*Pteris longifolia* sensu Sim, Ferns S. Afr. edn 2: 252, t. 125 (1915).

Rhizome creeping, up to 8 mm in diameter, set with linear-lanceolate, attenuate, pale brown rhizome-scales. *Fronds* spaced up to 10 mm apart, erect to arching, firmly membranous; *stipe* pale brown, terete, up to 120 mm long, glabrous except for numerous scales simi-









MAP 83.—*Pteris vittata*

lar to rhizome-scales basally; *lamina* elliptic-oblong, up to  $1,2 \times 0,4$  m, simply pinnate, tapering towards base; *pinnae* linear-attenuate, up to  $160 \times 14$  mm, glabrous, sterile margins minutely crenate, lower pinnae petiolate, the upper sessile; *veins* free; *rhachis* sulcate, pale brown, glabrous. *Sori* in submarginal lines extending for most of the length of the fertile pinnae; *indusium* membranous, subentire, Fig. 31: 1.

Widespread in paleotropical and paleotemperate regions. Widespread throughout Southern Africa to Angola, Zimbabwe, Mozambique, Zaire, Tanzania, Ethiopia, Sudan, Ghana, Algeria, Cape Verde Islands, Canary Islands, Madagascar, Mauritius, Comoro Islands, Zanzibar, Socotra and Yemen. Also E. India, China, Taiwan, Japan, Malaysia, Philippine Islands, New Guinea, New Caledonia, Polynesia, Australia (Hieronimus, 1914). Rock crevices in shade, from near sea level to 1 600 m. Map 83.

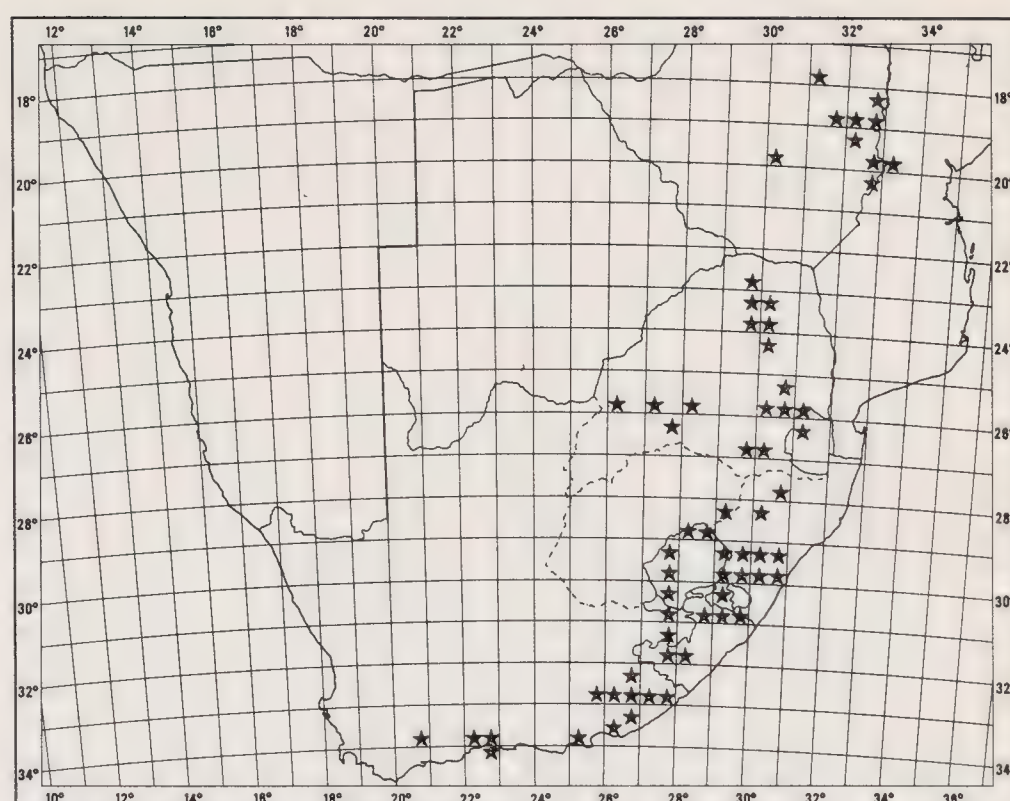
Vouchers: Galpin 8283 (BOL; PRE); Rodin 3885 (BOL; K; S); Schelpe 6100 (BM; BOL).

There is some variation in the shape of the pinnae among various African populations of this species. Also the rhachis is smooth in some and slightly muricate in others.

2. *Pteris cretica* L., Mant. 130 (1767); Sim, Ferns S. Afr. edn 2: 253, t. 126 (1915); Schelpe in Contr. Bolus Herb. 1: 60 (1969); in F.Z. Pterid.: 116 (1970); in C.F.A. Pterid.: 91 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 236, t. 168 (1983). Type: ?Italy, Arduino s.n. (LINN 1246/7, holo.).

*Pycnodoria cretica* (L.) Small, Ferns Florida 91 (1932).

*Pteris serraria* Swartz in J. Bot., Gött. 1800, 2: 65 (1801). Type: Cape Province, Thunberg s.n., Herb. Montini (S, holo.).



MAP 84.—*Pteris cretica*

Rhizome creeping, up to 10 mm in diameter, set with lanceolate, acuminate, entire, concolorous, dark brown rhizome-scales c. 3 mm long. *Fronds* tufted, erect, often dimorphous, firmly membranous to chartaceous; *stipe* stramineous to light brown, shallowly sulcate, glabrous, up to 0,65 m long; *lamina* ovate to deltate, mostly pinnate; *pinnae* and basal pinna-lobes linear-attenuate, the lower sessile, the upper adnate, decurrent, sterile margins of sterile and fertile pinnae bluntly to sharply serrate-dentate, sometimes undulate, sterile pinnae up to  $110 \times 24$  mm, fertile pinnae up to  $200 \times 9$  mm; *veins* free; *rhachis* stramineous, shallowly sulcate, glabrous. *Sori* in marginal lines extending for most of length of pinnae; *indusium* linear, subentire, membranous. Fig. 31: 2.

Cape Province, Lesotho, Natal, Transvaal, Zimbabwe, Angola, Zambia, Malawi, Tanzania, Kenya, Uganda, Zaire, Madagascar, Mauritius, Réunion, Ascension Island, St Helena and Cape Verde Islands. Also Southern Europe. In Southern Africa *P. cretica* occurs in the more temperate forests of the summer rainfall region, usually in the undergrowth of forest or scrub, but also along forest margins, 1 200–2 700 m. Map 84.

Vouchers: Acocks 11603 (NH; PRE); Dieterlen 282 (K; PRE; SAM); Esterhuysen 26072 (BM; BOL); Schelpe 6101 (BM; BOL).

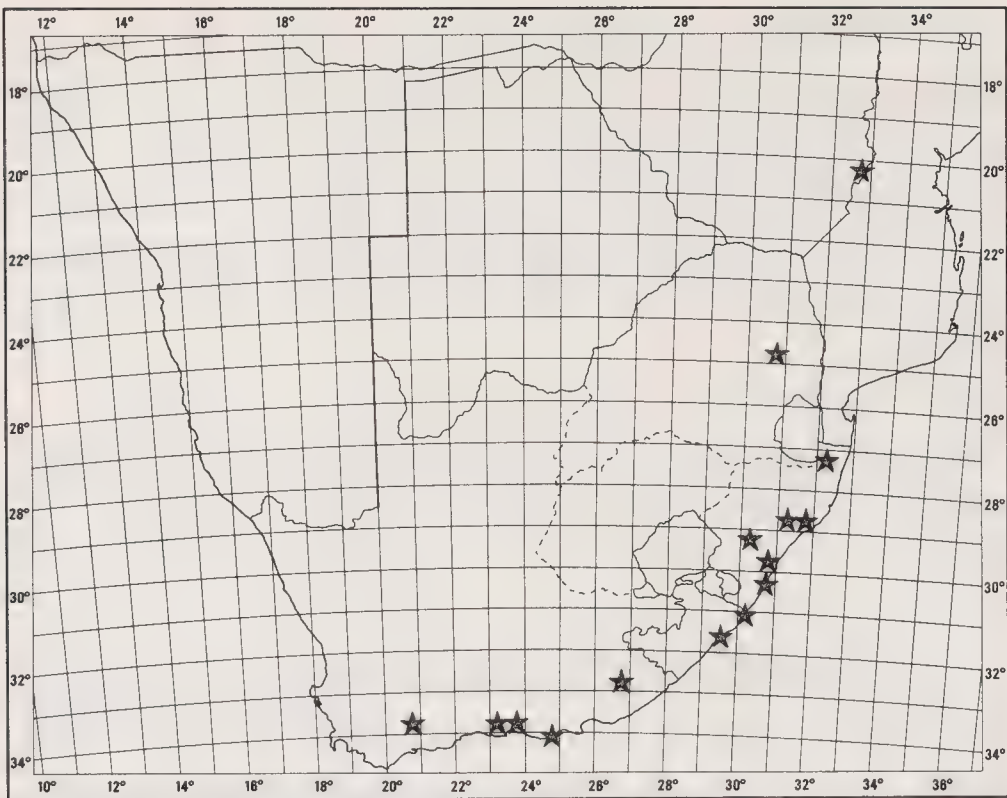
3. *Pteris buchananii* Bak. ex Sim, Ferns S. Afr. edn 1: 111, t. 46 (1892); op. cit. edn 2: 259, t. 130 (1915); Schelpe in Contr. Bolus Herb. 1: 62 (1969); in F.Z. Pterid.: 120 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 242, t. 174 (1983). Type: Natal, Inchanga, Buchanan s.n. (K, lecto.).





FIG. 33.—1, *Pteris dentata*, part of frond,  $\times 0,6$ ; 1a, detail of lower surface of part of pinna,  $\times 1,2$  (Schelpe 4343).  
 2, *Pteris catoptera*, part of frond,  $\times 0,6$ ; 2a, detail of upper surface of part of pinna,  $\times 1,8$  (Schelpe 5945).





MAP 85.—*Pteris buehneri*

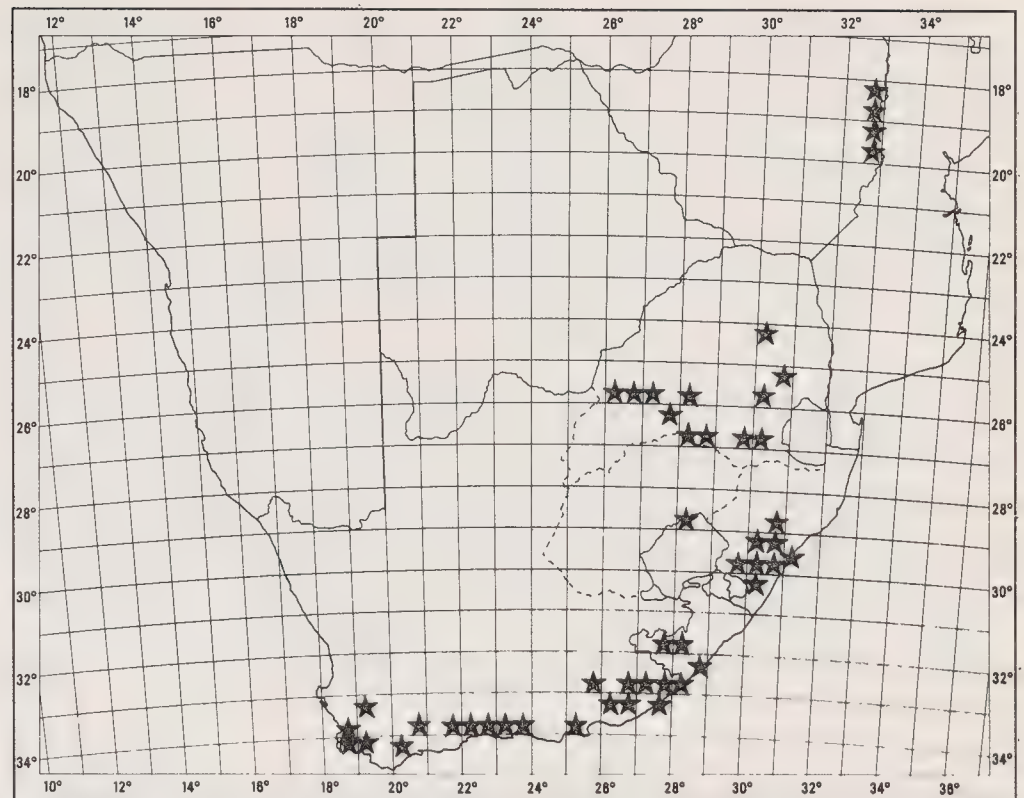
Rhizome widely creeping, c. 10 mm in diameter, set with sparse, ovate, acute, dark brown, entire rhizome-scales up to  $4,5 \times 3$  mm. *Fronds* widely spaced, herbaceous; *stipe* erect, stramineous to brown, glabrous, smooth, up to 1 m tall; *lamina* ascending, broadly deltate, up to  $0,5 \times 0,5$  m, 4-pinnatifid with basal pinnae nearly as long as lamina and basiscopically developed; *ultimate lobes* often slightly falcate, adnate to rhachis and decurrent, glabrous, up to  $26 \times 5$  mm, sterile lobes and apices of fertile lobes serrate; *costules* spinous ventrally; *veins* anastomosing only along more broadly winged parts of costae and costules; *rhachis* stramineous, glabrous, smooth but with a darker channel on upper surface. *Indusia* erose, membranous. Fig. 32.

Southern Cape Province, Natal, Transvaal, Zimbabwe, Kenya and Tanzania. Sporadic in the wetter forest regions of Southern Africa, most frequently around continually moist glades in tall forest, 250–1 200 m. Map 85.

Vouchers: *Lawn* 2038, 2039 (NH); *Schelte* 4334 (BM; BOL); *Wilms* 2410 (BM).

4. *Pteris dentata* Forssk., Fl. Aegypt.-Arab. 186 (1775); Sim, Ferns S. Afr. edn 2: 255, t. 129 (1915); Schelte in Contr. Bolus Herb. 1: 64 (1969); in C.F.A. Pterid.: 94 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 239, t. 171 (1983). Type: Yemen, *Forsskal* s.n. (lost); Yemen, *Schweinfurth* 1402 (C, neo.).

*Pteris flabellata* Thunb., Prodr. 172 (1800). *Pteris arguta* var. *flabellata* (Thunb.) Mett. ex Kuhn, Fil. Afr. 76 (1868). *Pteris dentata* subsp. *flabellata* (Thunb.) Runemark in Bot. Notiser 115: 190 (1962); Schelte in F.Z. Pterid.: 117 (1970). Type: Cape Province, Cape Peninsula, between Table Mountain and Lions Head, *Thunberg* s.n. (UPS, holo.!, BM-BOL, photo.!).



MAP 86.—*Pteris dentata*

Rhizome erect to procumbent, up to 10 mm in diameter, set with linear-lanceolate, atrocastaneous, nitid rhizome-scales up to 5 mm long with sparse, pale, marginal cilia. *Fronds* tufted, herbaceous, arching; *stipe* stramineous, becoming atrocastaneous basally, glabrous, up to 0,5 m long; *lamina* ovate, up to  $1 \times 0,4$  m, usually 3-pinnatifid, basal pinnae markedly developed basiscopically; *middle pinnae* narrowly oblong, attenuate, deeply pinnatifid into decurrent lobes up to  $32 \times 5$  mm, serrate towards the apices, glabrous on both surfaces, costa spinous ventrally; *veins* free; *rhachis* sulcate, stramineous to somewhat castaneous, glabrous, smooth. *Sori* in a marginal line extending for most of the length of the ultimate lobes; *indusium* erose or subentire, membranous. Fig. 33:1.

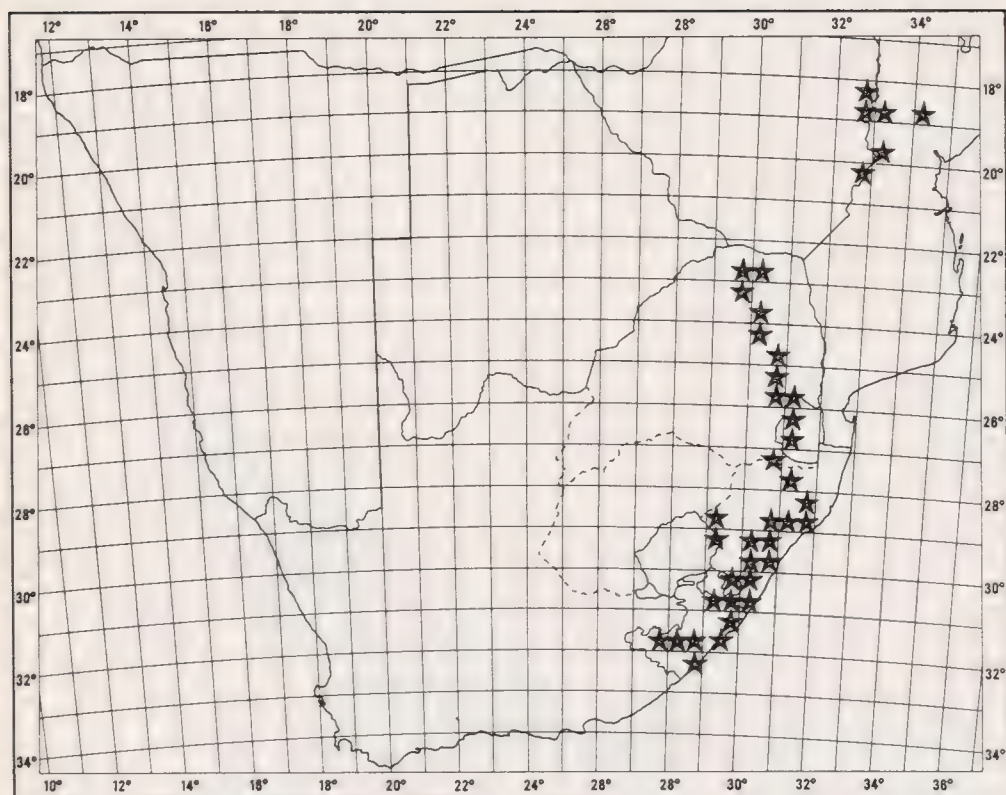
Cape Province, Lesotho, Natal, Transvaal, Zimbabwe, Malawi, Zaire, Angola, Tanzania, Kenya, Uganda, Ethiopia, Sudan, Fernando Po, Ascension Island, St Helena, Madagascar, Mauritius, Rodrigues and the Aegean Islands. Usually found in moist forest undergrowth, but sometimes occurs in south-western Cape Province in very sheltered moist ravines, 100–1 700 m. Map 86.

Vouchers: *Esterhuysen* 10040 (BOL; PRE); *Fisher* 900 (NH; NU; PRE); *Schlechter* 4600 (BM; BOL; GRA; K; PRE).

*Pteris tremula* R. Br. from New Zealand, which has similarly dentate pinnule apices, has become naturalised in the Kirstenbosch and Newlands areas of the Cape Peninsula. *P. tremula* differs in having a more divided lamina: the pinnae more than halfway up the rhachis are 2-pinnatifid. In *P. dentata* usually only the basal 1–3 pairs of pinnae are 2-pinnatifid.

5. *Pteris catoptera* Kunze in Linnaea 18: 119 (1844); Schelte in F.Z. Pterid.: 118 (1970); W. B. G. Jacobsen, Ferns Sthn Afr.



MAP 87.—*Pteris catoptera*

240, t. 172 (1983). Type: Natal, between the Omfondi and Tugela Rivers, *Gueinzus* s.n. (LZ, holo.†; K, lecto.!).

*Pteris quadriaurita* Retz. subsp. *catoptera* (Kunze) Schelpe in Contr. Bolus Herb. 1: 66 (1969); in C.F.A. Pterid.: 95 (1977).

*Pteris biaurita* sensu Sim, Ferns S. Afr. edn 2: 257, t. 127 (1915).

*Pteris abrahamii* Hieron. in Bot. Jb. 53: 409 (1915). Type: Natal, Mapumulo near the Umvoti River, *Abraham* 27 (B, holo.!--BOL, photo.!).

Rhizome erect to procumbent, set with linear-attenuate, atrocastaneous rhizome-scales c. 3,5 mm long with pale ciliate margins. *Fron*ds tufted herbaceous, arching; *stipe* stramineous, tending to castaneous basally, up to 0,9 m long, smooth or set with slender spines, glabrous except for basal scales; *lamina* oblong-ovate, up to 0,9 × 0,6 m, 3-pinnatifid, lower pinnae much-developed basiscopically; *upper pinnae* very narrowly oblong, acute, glabrous on both surfaces but with spines on costae and costules above and with or without slender spines on costae below; *ultimate lobes* linear to broadly linear, obtuse, decurrent; *veins* free; *rhachis* sulcate, stramineous, glabrous, smooth or spiny. *Sori* in marginal lines; *indusium* erose, membranous. Fig. 33: 2.

From eastern Cape Province through Natal, Swaziland and Transvaal to Zimbabwe, Angola, Mozambique, Zambia, Malawi, Tanzania, Kenya and Ethiopia. Moist and variously shaded habitats in forest undergrowth or on forest margins, 20–1 900 m. Map 87.

Vouchers: *Fisher* 833 (NH; NU; PRE); *Pegler* 1553 (PRE); *Schelpe* 6009 (BOL); 6017 (BOL).

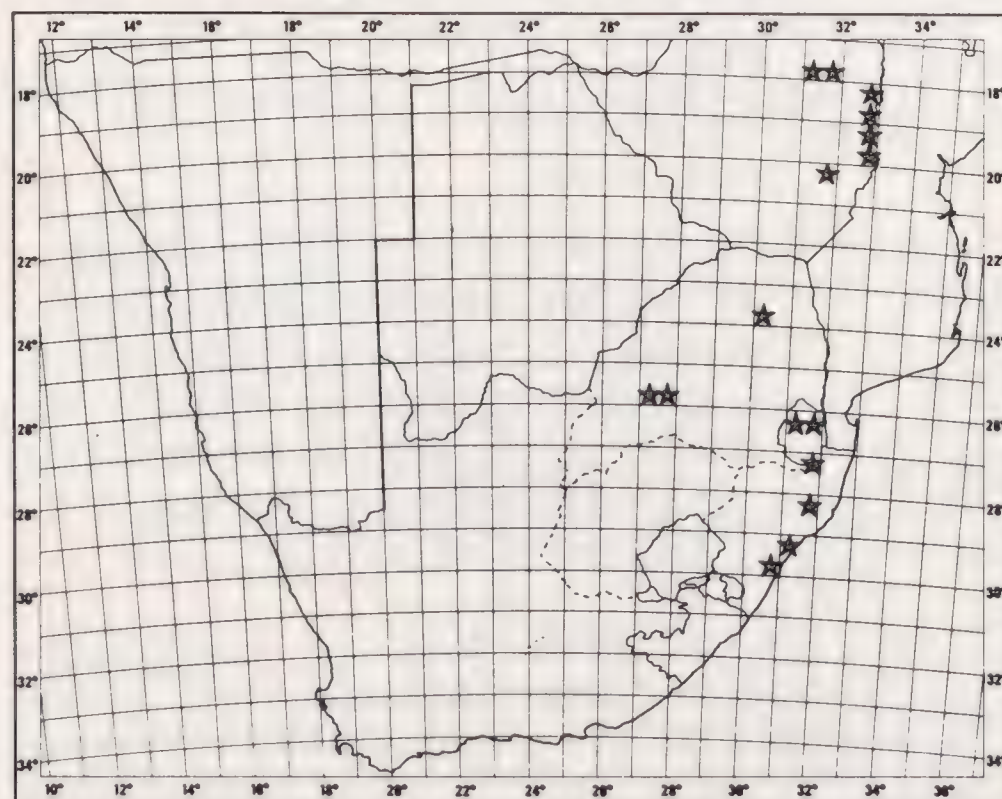
6. *Pteris friesii* Hieron. in R.E. Fr. in Wiss. Ergebn. Schwed. Rhod.-Kongo-Exped. 1: 5 (1914); Schelpe in F.Z. Pterid.: 118 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 242, t. 173 (1983). Type: Zambia, near Abercorn, *Fries* 1220 (UPS, holo.!!; B, iso.!--BOL, photo.!).

*Pteris quadriaurita* Retz. subsp. *friesii* (Hieron.) Schelpe in Contr. Bolus Herb. 1: 66 (1969); in C.F.A. Pterid.: 96 (1977).

Rhizome erect to procumbent, c. 15 mm in diameter, set with lanceolate-attenuate rhizome-scales c. 3 mm long with dark central stripe and pale ciliate-fimbriate borders. *Fron*ds tufted, erect to arching, chartaceous to coriaceous; *stipe* stramineous to castaneous, up to 0,6 m long, glabrous except for dark brown scales basally; *lamina* narrowly ovate-deltate, up to 0,7 × 0,5 m; *upper pinnae* narrowly oblong-attenuate, glabrous on both surfaces but costae spinous above; *ultimate lobes* broadly linear, obtuse, only slightly decurrent, entire, up to 28 × 5 mm; *veins* free; *rhachis* sulcate, stramineous to castaneous, glabrous, smooth. *Sori* in marginal lines; *indusia* entire, membranous.

Swaziland, Transvaal, Zimbabwe, Mozambique, Zambia, Zaire, Kenya, Uganda, Tanzania, Sudan, Madagascar, Comoro Islands, Mauritius and Seychelles. Undergrowth of scrub and forest, 600–1 750 m. Map 88.

Vouchers: *Burke* 140 (K); *Schütte* 62 (BOL).

MAP 88.—*Pteris friesii*



## 7. CHEILANTHES

**Cheilanthes** Swartz, Syn. Fil. 5, 126 (1806); Engl., Pflanzenw. Afr. 2: 40 (1908); Tardieu-Blot in Mém. Inst. fr. Afr. noire 28: 87 (1953); in Fl. Madag. 5, 1: 136 (1958); Alston in F.W.T.A. edn 2, Suppl. 43 (1959); Tardieu-Blot in Fl. Camer. 3: 136 (1964); Launert in F.S.W.A. 7: 1 (1969); Schelpe in F.Z. Pterid.: 122 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 58 (1973); in C.F.A. Pterid.: 98 (1977), nom. conserv. Type species: *C. micropteris* Swartz.

Rhizome erect or shortly creeping, set with lanceolate rhizome-scales, concolorous or with a dark sclerotic central stripe. *Fronds* tufted, uniform or rarely dimorphous; *stipes* terete or sulcate, castaneous to black, glabrous and nitid or pilose; *lamina* herbaceous to coriaceous, 2- to 5-pinnatifid, ultimate segments not articulated, glabrous, thinly pilose, pilose or tomentose, with or without lacerate scales on costae and costules. *Sori* discrete or linear, borne marginally on vein-endings, protected by a continuous or discontinuous indusium or by the recurved margin of the ultimate segments.

As construed here the genus *Cheilanthes* includes Southern African species previously referred to the genus *Notholaena* R. Br., as well as *Doryopteris* J. Sm. and the species of *Pellaea* Link with non-articulated segments. It is a cosmopolitan genus of terrestrial ferns, usually growing in rather dry, rocky places.

Since going to press the following species from high altitudes of the Drakensberg in eastern Transvaal has been described: *Cheilanthes hyaloglandulosa* W. B. G. & N. Jacobsen in S. Afr. J. Bot. 51: 145–148 (1985). It differs from the widespread *C. hirta* Swartz (no. 9) mainly by a dense cover of hyaline unicellular globular glands.

## 1a Stipe and/or rhachis terete in cross-section:

## 2a Rhizome-scales with a castaneous to ebeneous sclerotic central stripe:

## 3a Lamina tomentose below:

4a Lamina narrowly linear, pinnate to 2-pinnatifid ..... 1. *C. rawsonii*

4b Lamina ovate-oblong to lanceolate, 2-pinnate to 3-pinnatifid:

5a Lamina decrescent basally; pinnae narrowly deltate to ovate-deltate, set with hairs only ..... 2. *C. marlothii*5b Lamina not decrescent basally; pinnae broadly deltate, set with both hairs and scales ..... 3. *C. eckloniana*

## 3b Lamina glabrous or pilose below:

6a Lamina glabrous and viscid on both surfaces ..... 6. *C. parviloba*

6b Lamina set with scattered multicellular hairs on both surfaces, not viscid:

7a Rhizome suberect, fronds tufted; lamina herbaceous; most hairs on frond standing at right angles to surface ..... 9. *C. hirta*7b Rhizome long-creeping, fronds spaced; lamina subcoriaceous; most hairs on frond appressed or spreading at an angle of less than 90° ..... 8. *C. contracta*2b Rhizome-scales concolorous ..... 4. *C. inaequalis*

## 1b Stipe and rhachis sulcate above:

## 8a Older rhizome-scales with a distinct nitid, castaneous to ebeneous, sclerotic central stripe:

9a Lamina outline pentagonal (basal pinnae nearly as long as or longer than lamina and conspicuously developed basiscopically):

## 10a Venation obscure on upper surface:

11a Lamina 2- to 3-pinnatifid ..... 25. *C. concolor*

11b Lamina 3- to 5-pinnate:

12a Indusium continuous ..... 20. *C. quadripinnata*12b Indusium discontinuous ..... 21. *C. multifida*

## 10b Venation apparent on upper surface:

13a Lamina herbaceous, set with hairs along costae and veins ..... 24. *C. bergiana*13b Lamina coriaceous, glabrous ..... 22. *C. pentagona*

## 9b Lamina outline linear, lanceolate, ovate or deltate (basal pinnae much shorter than lamina):

## 14a Sori discrete; indusium discontinuous:

15a Lamina set with scales (biseriate or broader) ..... 5. *C. induta*15b Lamina glabrous ..... 21. *C. multifida*

## 14b Sori linear, marginal; indusium continuous or absent:

16a Indusium absent; lamina outline linear and pinnae divided into three or five pinnules ..... 7. *C. depauperata*

16b Indusium present; lamina outline lanceolate, ovate or deltate or pinnae pinnatifid or pinnate into numerous segments:

17a Stipe set with numerous scales at maturity:





FIG. 34.—1, *Cheilanthes rawsonii*, part of plant,  $\times 0,6$ ; 1a, detail of lower surface of pinna,  $\times 3,6$  (Acocks 18023). 2, *C. inaequalis* var. *inaequalis*, frond,  $\times 0,6$ ; 2a, detail of lower surface of pinnule,  $\times 1,8$  (Galpin 9126). 3, *C. inaequalis* var. *buchananii*, part of plant,  $\times 0,6$ ; 3a, detail of lower surface of pinna,  $\times 1,8$  (Flanagan 2580).



- 18a Stipe brown ..... 17. *C. botswanae*
- 18b Stipe atrocastaneous ..... 18. *C. involuta*
- 17b Stipe glabrous or with few scales at maturity:
  - 19a Lamina usually 4-pinnate; red-tipped paraphyses present in sorus ..... 20. *C. quadripinnata*
  - 19b Lamina 1–3-pinnate; sori non-paraphysate ..... 19. *C. viridis*
- 8b Rhizome set with pale concolorous scales only, or with a few striped scales on oldest parts of rhizome, stripe diffuse:
  - 20a Rhachis winged by lamina:
    - 21a Indusium discrete, lacerate ..... 12. *C. capensis*
    - 21b Indusium continuous, erose or entire:
      - 22a Sulcus (groove) of stipe square; under surface of secondary rhachises green ..... 10. *C. robusta*
      - 22b Sulcus of stipe rounded; under surface of secondary rhachises castaneous ..... 14. *C. deltoidea*
  - 20b Rhachis not winged by lamina:
    - 23a Indusium continuous:
      - 24a Frond set with numerous serrulate scales ..... 16. *C. dolomiticola*
      - 24b Frond glabrous at maturity or stipe only set with occasional entire scales:
        - 25a Indusium folded under reflexed lamina margin; stipe castaneous ..... 11. *C. hastata*
        - 25b Indusium not folded under margin; stipe atrocastaneous ..... 15. *C. namaquensis*
    - 23b Indusium discontinuous or discrete:
      - 26a Fronds greater than 100 mm tall; sulcus of stipe square ..... 23. *C. dinteri*
      - 26b Fronds less than 100 mm tall; sulcus of stipe rounded ..... 13. *C. kunzei*

1. ***Cheilanthes rawsonii* (Pappe) Mett. ex Kuhn**, Fil. Afr. 75 (1868); W. B. G. Jacobsen, Ferns Sthn Afr. 250, t. 180 (1983); N. C. Anthony in Contr. Bolus Herb. 11: 10, t. 1 (1984). Type: Cape Province, Namaqualand, on hills between Spektakel and Komaggas, *Whitehead* s.n. (BM, holo.!–BOL, photo.!!; K!–BOL, microfiche!!; S!).

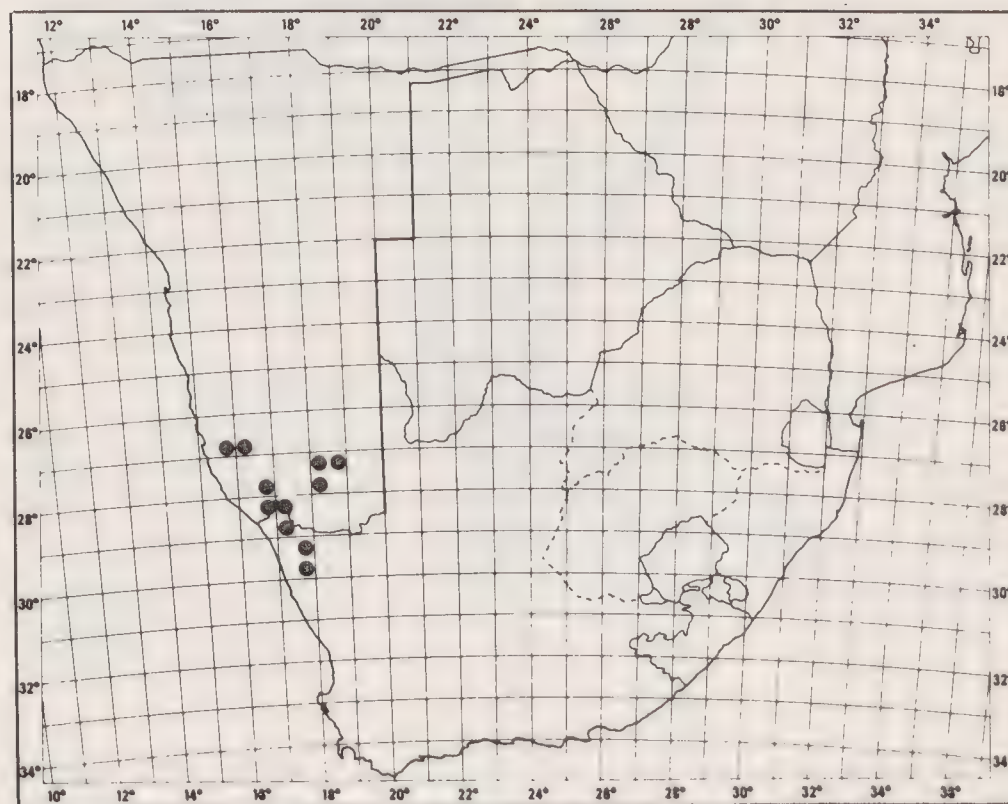
*Notholaena rawsonii* Pappe in Pappe & Raws., Syn. Fil. Afr. Austr. 42 (1858); Sim, Ferns S. Afr. edn 2: 220, t. 107 fig. 1 (1915).

Rhizome creeping, c. 2,5 mm in diameter, set with lanceolate, fimbriate rhizome-scales c.  $3 \times 0,4$  mm with an ebeneous central stripe and broad paler margins tapering into a long, concolorous, sinuous apex. *Fronds* erect, subcoriaceous, c. 200 mm long; *stipe* castaneous to atrocastaneous, terete, tomentose with fine, pale, multicellular hairs, becoming subglabrous with age, and set with concolorous, fimbriate scales of different sizes basally; *lamina* narrowly linear, c.  $150 \times 15$  mm, pinnate to 2-pinnatifid, somewhat decrescent basally; *pinnae* oblong-deltate, deeply pinnatifid into rounded oblong lobes, upper surface pilose, under surface with thick reddish tomentum; *venation* obscure; *rhachis* and *secondary rhachises* castaneous to atrocastaneous, tomentose with pale, multicellular hairs. *Sori* discrete, borne at margins of ultimate segments, elongate, perpendicular to margin, almost obscured by the tomentum, exindusiate. Fig. 34:1.

Endemic to southern South West Africa/Namibia and north-western Cape Province. In rocky areas, c. 1 400 m. Map 89.

Vouchers: *Dinter* 6229 (BOL; K; STE); *Giess* 12854 (NBG; PRE); *Hall* s.n. (B; BOL; GH; K; M; MO; P; PRE; S; US); *Pearson* 8290 (BOL; STE); *Williamson* 2559 (BOL).

2. ***Cheilanthes marlothii* (Hieron.) Schelpe** in Contr. Bolus Herb. 1: 74 (1969); in C.F.A. Pterid.: 103 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 259, t. 186 (1983); N. C. Anthony in Contr. Bolus Herb. 11: 17, t. 3 (1984). Type: South West Africa/Namibia, Okahandja, *Dinter* 386 (B, lecto.!!; BR!!; GRA!!; SAM!–BOL, photo.!!).



MAP 89.—*Cheilanthes rawsonii*







*Notholaena marlothii* Hieron. in Bot. Jb. 46: 384 (1911); Launert in F.S.W.A. 7: 5 (1969).

Rhizome shortly creeping, up to 4 mm in diameter, set with entire, acuminate, pale ferruginous rhizome-scales c.  $3 \times 0,3$  mm with an ebeneous central stripe. *Fronde*s erect, herbaceous to coriaceous; *stipe* castaneous, terete, nitid, tomentose with pale hairs c. 2 mm long, becoming subglabrous with age, and set with lanceolate, concolorous pale brown scales c.  $3 \times 0,3$  mm basally; *lamina* linear-lanceolate, c.  $100-300 \times 20-50$  mm, 2-pinnate to 3-pinnatifid, basal pinnae reduced; *pinnae* lanceolate-deltate, pinnatifid into unequally deltoid-oblong, rounded lobes, upper surface pilose with white hairs; under surface tomentose with unidirectional pale to reddish hairs; *venation* obscure; *rhachis* and *secondary rhachises* terete, atrocastaneous, tomentose with white hairs up to 2 mm long. *Sori* discrete, marginal, elongate, perpendicular to the margin, almost obscured by the tomentum; *indusium* subentire, c. 0,1–0,2 mm wide. Fig. 35: 2.

Angola, South West Africa/Namibia and Transvaal. In rock crevices and around boulder bases (often dolomite) usually on south aspect slopes, c. 1 700–2 100 m. Map 90.

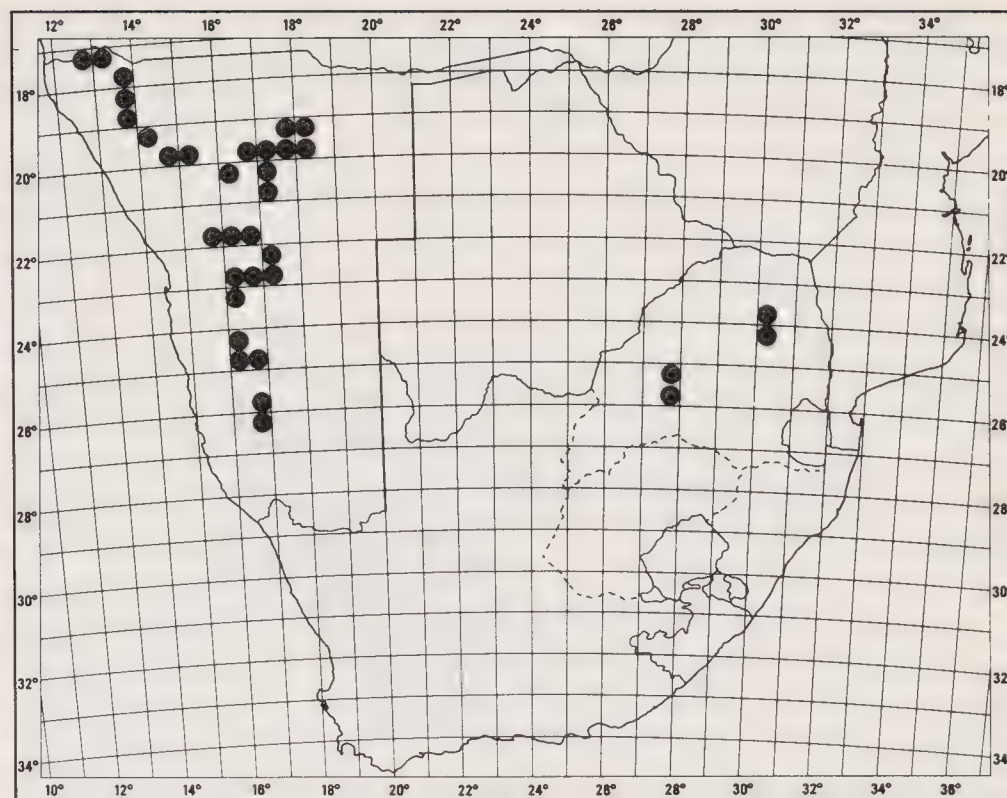
Vouchers: *Codd* 10432 (BOL); *Dinter* 386 (BR; SAM); *Schelp*e 4759 (B; BOL; GH; K; M; MO; P; PRE; S; US); *Schweickerdt* 2125 (BOL; NU; PRE); *Steyn* 181 (NBG).

3. *Cheilanthes eckloniana* (Kunze) Mett. in Abh. senckenb. naturforsch. Ges. 3: 66 (1859), reimpr. in Mett., Farngatt. 5: 22 (1859); *Schelp*e in Contr. Bolus Herb. 1: 73 (1969); in F.Z. Pterid.: 125 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 256, t. 184 (1983); N. C. Anthony in Contr. Bolus Herb. 11: 22, t. 4 (1984). Type: Cape Province, Sneeuwberg, *Drège* s.n. (LZ, syn.†; BM, lecto.†; GRA†; L-BOL, photo.!).

*Notholaena eckloniana* Kunze in Linnaea 10: 501 (1836); Sim, Ferns S. Afr. edn 2: 222, t. 107 fig. 2 (1915).

*Notholaena krebsiana* Presl, Tent. Pterid. 224 (1836), reimpr. in Abh. K. Böhm. Ges. Wiss., ser. 4, 5: 224 (1837), nom. nud.

Rhizome creeping, c. 4 mm in diameter, set with both concolorous and castaneous- to ebeneous-striped, serrulate, broadly ovate-lanceolate, attenuate rhizome-scales up to 3 mm



MAP 90.—*Cheilanthes marlothii*

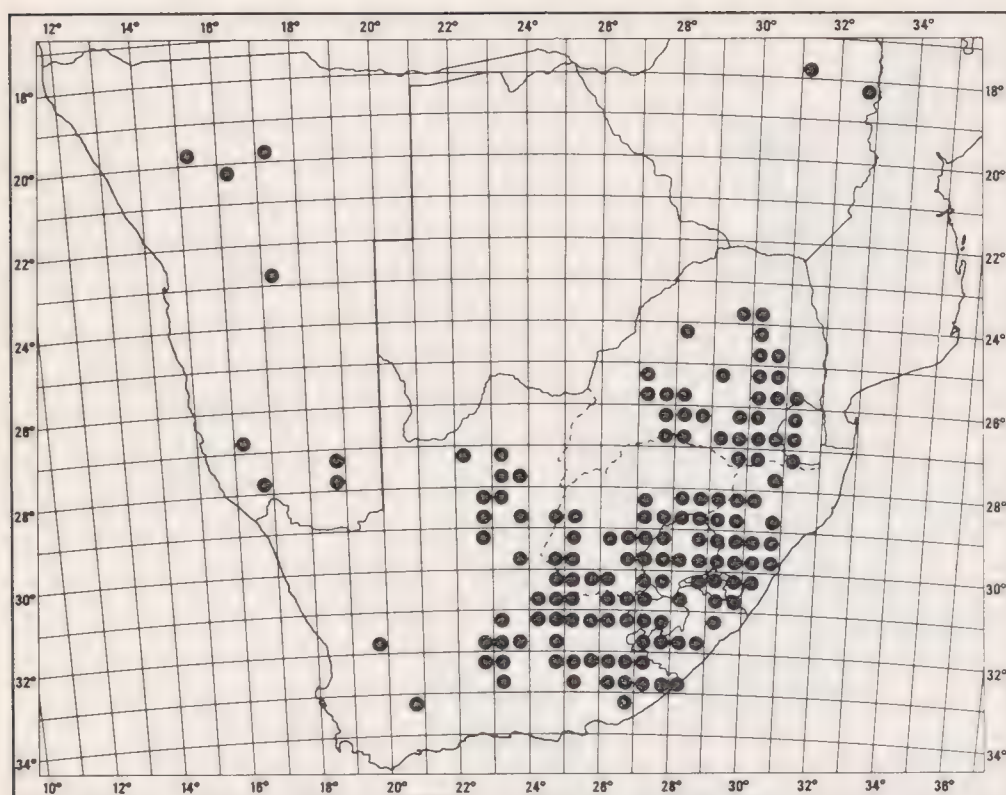
long. *Fronde*s erect, thinly coriaceous; *stipe* terete, atrocastaneous, set with pale, attenuate, lanceolate, fimbriate scales of different sizes, gradually becoming subglabrous with age, and set with a mass of concolorous reddish scales basally; *lamina* narrowly oblong, acute, up to  $110 \times 30$  mm, not decrescent below, 2-pinnate to 3-pinnatifid; *pinnae* deltate; *pinna segments* deeply pinnatifid into obtuse lobes, upper surface with wavy fine white matted hairs and becoming glabrous with age, under surface densely tomentose with matted ferruginous hairs and set with fimbriate, lanceolate, attenuate, concolorous pale brown scales along costae and costules; *venation* obscure. *Sori* marginal, forming an interrupted soral line; *indusium* very small, membranous, ciliate or absent. Fig. 35:1.

Widespread throughout Southern Africa as far north as Zimbabwe and endemic to this area. Usually found on rock outcrops with a south aspect or well-drained sites, between 1 000 and 2 000 m. Map 91.

Vouchers: *Liebenberg* 7631 (NBG; PRE); *Schelp*e 5891 (B; BM; BOL; GH; K; M; MO; P; PR; PRE; S; US); *Schelp*e 7702 (B; BOL; C; GH; K; M; MO; P; PR; S); *Schlechter* 4704 (BM; BOL; GRA; PRE; SAM); *Thorncroft* s.n. (BOL; GRA; J; PRE; STE).

4. *Cheilanthes inaequalis* (Kunze) Mett. in Abh. senckenb. naturforsch. Ges. 3: 68, t. 3 fig. 4 (1859), reimpr. in Mett., Farngatt. 5: 24, t. 3, fig. 4 (1859). Type: Transvaal, Magaliesberg, *Burke* s.n. (LZ, holo.†; BM!-BOL, photo.†; K!).



MAP 91.—*Cheilanthes eckloniana*

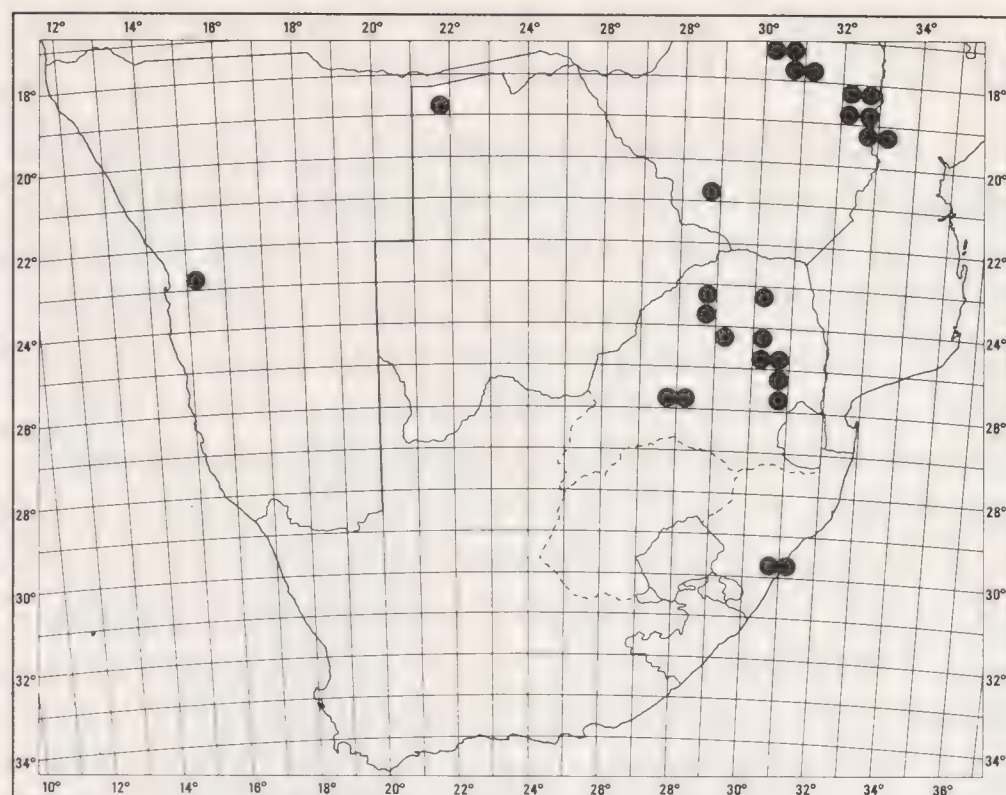
Rhizome short, creeping, c. 5 mm in diameter, set with linear-lanceolate, attenuate, entire, concolorous ferrugineous rhizome-scales up to 14 mm long. *Fronds* erect, herbaceous to coriaceous; *stipe* terete, atrocataeuous, set with pale, multicellular hairs and with scales similar to rhizome-scales basally; *lamina* narrowly oblong to ovate-deltate (deltate in juveniles), up to 220 × 110 mm, 2-pinnatifid towards apex, 3-pinnatifid basally, not decrescent below; *pinnae* unequally deltate, developed basiscopically (especially basal pair), very deeply pinnatifid into oblong to very narrowly oblong, subentire crenate or pinnatifid, obtuse segments, under surface pilose to densely tomentose with long 3- to 5-celled hairs, white at first, becoming ferrugineous with age, upper surface pilose; *venation* obscure. *Sori* borne around margins of ultimate segments, discrete but forming a continuous soral line at maturity; *indusium* continuous or irregularly discontinuous, narrow, ciliate, membranous. Fig. 34: 2 & 3.

Lamina outline generally oblong to ovate-deltate, lamina 2-pinnatifid; under surface tomentose with matted hairs ..... (a). var. *inaequalis*

Lamina outline generally pentagonal, lamina 3-pinnatifid; under surface pilose with straight hairs ..... (b). var. *buchananii*

#### 4(a). var. *inaequalis*.

Schelpe in Contr. Bolus Herb. 1: 74 (1969); in F.Z. Pterid.: 126, t. 39A (1970); in C.F.A. Pterid.: 103 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 257, t. 185 a & b (1983); N.C. Anthony in Contr. Bolus Herb. 11: 33, t. 5 (1984).

MAP 92.—*Cheilanthes inaequalis* var. *inaequalis*

*Notholaena inaequalis* Kunze, Farnkr. 1: 146, t. 64 fig. 1 (1844); Sim, Ferns S. Afr. edn 2: 221, t. 108 fig. 2 (1915); Launert in F.S.W.A. 7: 4 (1969).

*Notholaena bipinnata* (Sim) Sim, Ferns S. Afr. edn 2: 224 (1915), pro parte (excl. t. 109 fig. 2), non Liebm. (1849).

South West Africa/Namibia, Natal, Transvaal, Zimbabwe, Malawi, Zambia and Tanzania (Gill & Mwasumbi, 1976); also Guinea, Nigeria, Cameroun and Madagascar (Tardieu-Blot, 1964). Among rocks in open woodland, from 460 to 1 850 m in Southern Africa and 2 140 m in tropical Africa. Map 92. Fig. 34: 2.

Vouchers: Banks 46 (PRE); Codd & Dyer 9103 (BOL; K; PRE); Dinter 2391 (SAM); Esterhuysen 21483 (BOL; PRE); Killick 46 (NU).

4(b). var. *buchananii* (Bak.) Schelpe in Bolm Soc. broteriana, sér. 2, 41: 211 (1967); in Contr. Bolus Herb. 1: 75 (1969); in F.Z. Pterid.: 126, t. 39B (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 258, t. 185 c & d (1983); N.C. Anthony in Contr. Bolus Herb. 11: 38, t. 7 (1984). Type: Natal, Buchanan & McKen 32 (K, lecto!).

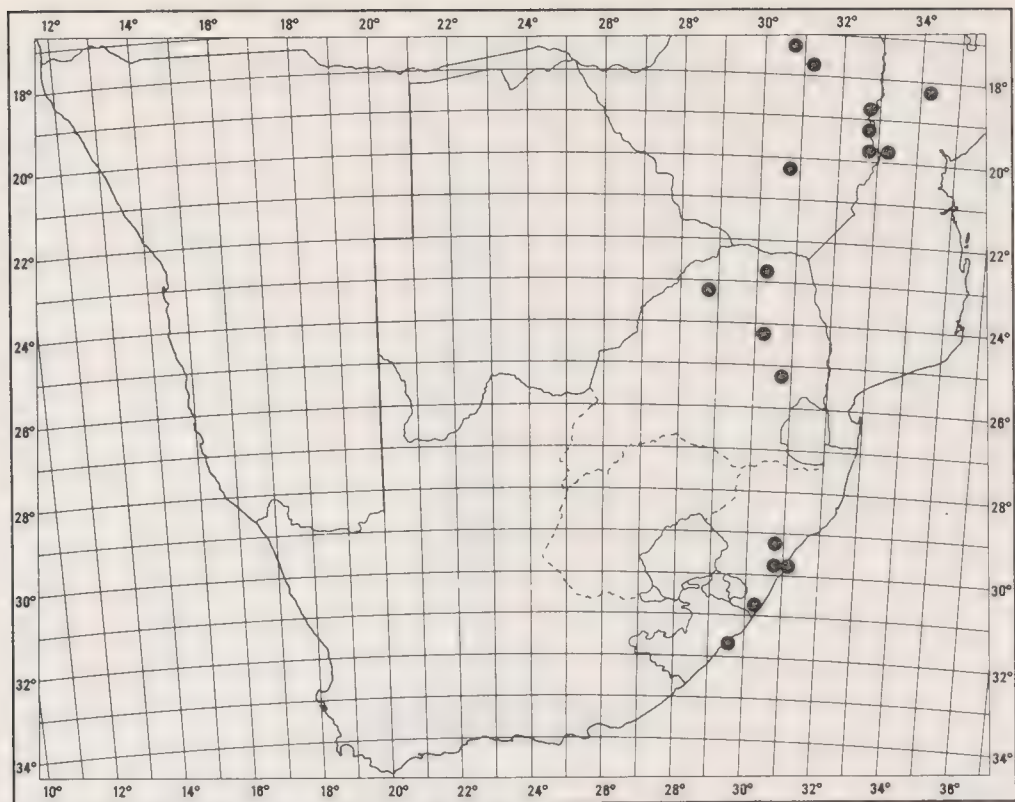
*Notholaena buchananii* Bak. in Hook. & Bak., Syn. Fil. 373 (1868); Sim, Ferns S. Afr. edn. 2: 222, t. 108 fig. 1 (1915).

Transkei, Natal, Transvaal, Zimbabwe, Mozambique, Zambia and Tanzania. Amongst rocks in moist positions, usually under shade, 1 200–2 000 m. Map 93. Fig. 34: 3.

Vouchers: Esterhuysen 21491 (BOL); Flanagan 2580 (PRE; SAM); Kluge 732 (PRE); Roux 679 (NBG).

The variety *buchananii* occurs in more sheltered and moister localities than the typical variety.





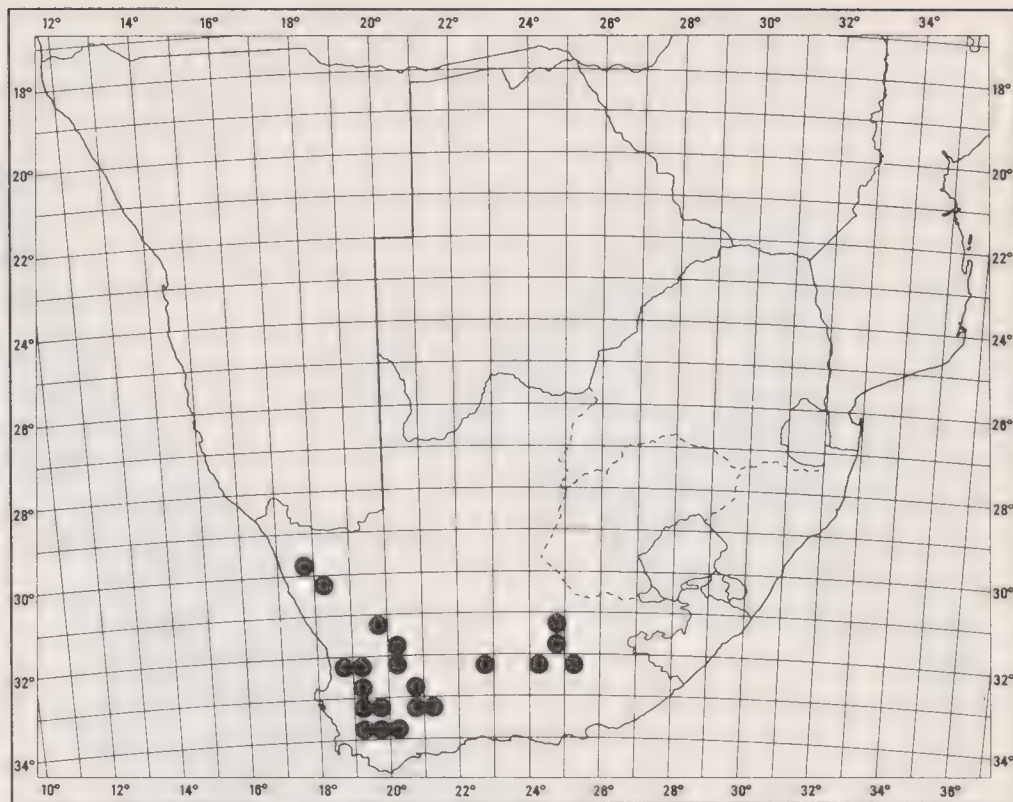
MAP 93.—*Cheilanthes inaequalis* var. *buechananii*

5. *Cheilanthes induta* Kunze in Linnaea 10: 538 (1836); Sim, Ferns S. Afr. edn 2: 232, t. 91 fig. 1 (1915); W. B. G. Jacobsen, Ferns Sthn Afr. 263, t. 188 (1983); N. C. Anthony in Contr. Bolus Herb. 11: 43, t. 8 (1984). Type: Cape Province, Sneeuwberg, Drège 8829 (LZ, holo.†; B, lecto.!—BOL, photo.!).

*Myriopteris induta* (Kunze) Fée, Gen. Fil. 149, t. 12A fig. 3 (hairs only) (1852).

Rhizome widely creeping, c. 5 mm in diameter, set with appressed, attenuate, subentire, ferrugineous rhizome-scales c.  $3 \times 0,4$  mm, with a dark central stripe and a somewhat fimbriate, attenuate apex. *Fronde* erect, thinly coriaceous; *stipe* castaneous to atrocastaneous, broadly sulcate, set with both narrow and broad, scattered, pale concolorous scales c. 2 mm long; *lamina* broadly lanceolate, c.  $250 \times 50$  mm, 3-pinnate to 4-pinnatifid, basal pinnae not reduced, sometimes largest; *pinnae* and *pinnales* broadly lanceolate to deltate; *ultimate segments* deeply pinnatifid into rounded-oblong, crenate segments, upper surface glabrous except for very occasional pale scales, under surface thickly or thinly tomentose with long, wavy or straight, pale to ferrugineous scales; *venation* obscure; *rhachis* and *secondary rhachises* sulcate, castaneous to atrocastaneous, pilose with pale to ferrugineous scales. *Sori* borne around margins of ultimate segments; *indusium* discontinuous, subentire, green or pale membranous, up to 0,5 mm wide.

Restricted to the mountains of north-western, south-western and southern Cape Province. Around boulder bases and in rock crevices between 600 and 2 300 m altitude. Map 94.



MAP 94.—*Cheilanthes induta*

Vouchers: Esterhuysen 22854 (BOL; PRE); 27200 (B; BM; BOL; C; GH; M; MO; P; PR; PRE; S); Penzhorn 5905 (PRE); Rourke 1685 (BOL; NBG); Schelpe 1925 (BOL; PRE).

6. *Cheilanthes parviloba* (Swartz) Swartz, Syn. Fil. 128, 331 (1806); Sim, Ferns S. Afr. edn 2: 230, t. 111 fig. 2, t. 112 (1915); W. B. G. Jacobsen, Ferns Sthn Afr. 260, t. 15, 187 (1983); N. C. Anthony in Contr. Bolus Herb. 11: 48, t. 9 (1984). Type: Cape of Good Hope, Drège b (S, lecto.!).

*Adiantum parvilobum* Swartz in J. Bot., Gött. 1800, 2: 85 (1801). *Cheilanthes hirta* var. *parviloba* (Swartz) Kunze in Linnaea 10: 541 (1836).

Rhizome creeping, c. 4 mm in diameter, set with lanceolate, entire, castaneous rhizome-scales c.  $2 \times 0,25$  mm with broad, pale brown borders. *Fronde* erect to arching, herbaceous to coriaceous; *stipe* terete, castaneous, pilose with patent or appressed, 1- to 3-celled hairs c. 0,5 mm long; *lamina* ovate-lanceolate, c.  $250 \times 40$  mm, 2-pinnate to 3-pinnatifid, basal pinnae reduced; *pinnae* lanceolate to narrowly deltate; *pinnales* narrowly oblong to narrowly deltate, c.  $5 \times 2$  mm, pinnatifid into oblong, often bilobed segments, under surface glabrous, upper surface viscid, collecting debris; *venation* obscure; *rhachis* and *secondary rhachises* terete, castaneous, set with glandular hairs c. 0,5 mm long. *Sori* borne at apices of ultimate lobes, protected by revolute margin of lamina; *indusium* absent. Fig. 36: 1.

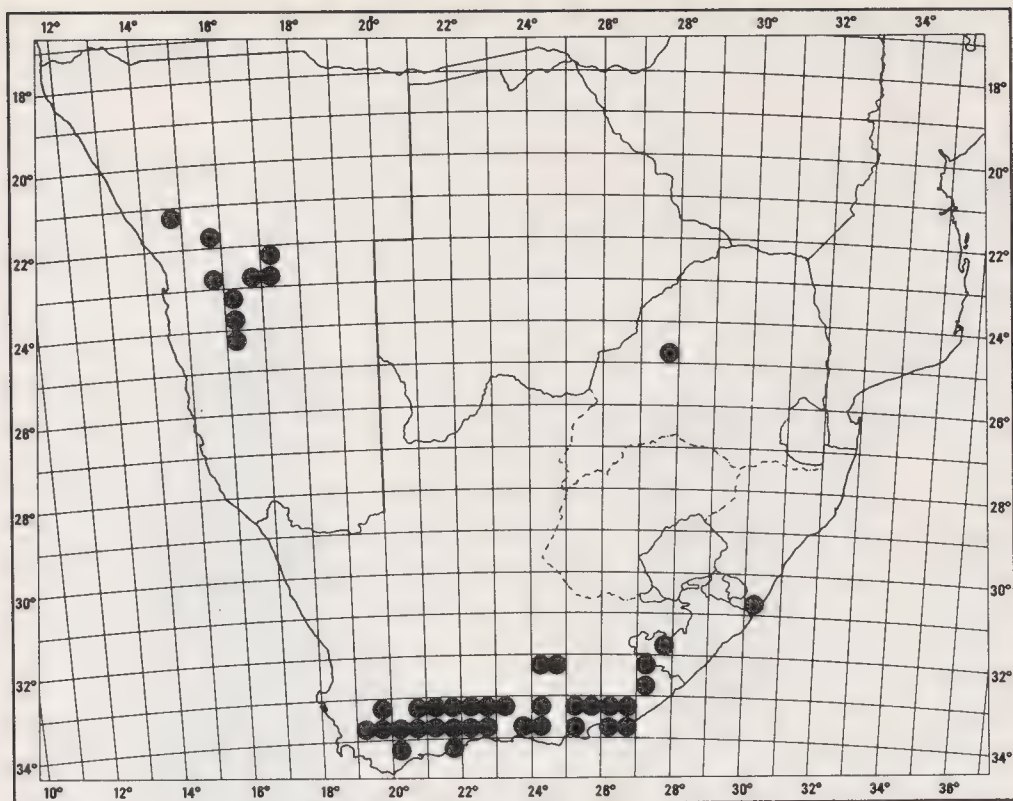
South West Africa/Namibia and Cape Province; rare in Natal and Transvaal. Dry rocky slopes and rock crevices on all aspects, 280–2 570 m altitude. Map 95.





FIG. 36.—1, *Cheilanthes parviloba*, part of plant,  $\times 0,6$ ; 1a, detail of lower surface of pinna,  $\times 8,1$  (Esterhuysen 25872). 2, *Cheilanthes depauperata*, part of plant,  $\times 0,6$ ; 2a, detail of lower surface of pinna,  $\times 4,2$  (Schelpe 5918).





MAP 95.—*Cheilanthes parviloba*

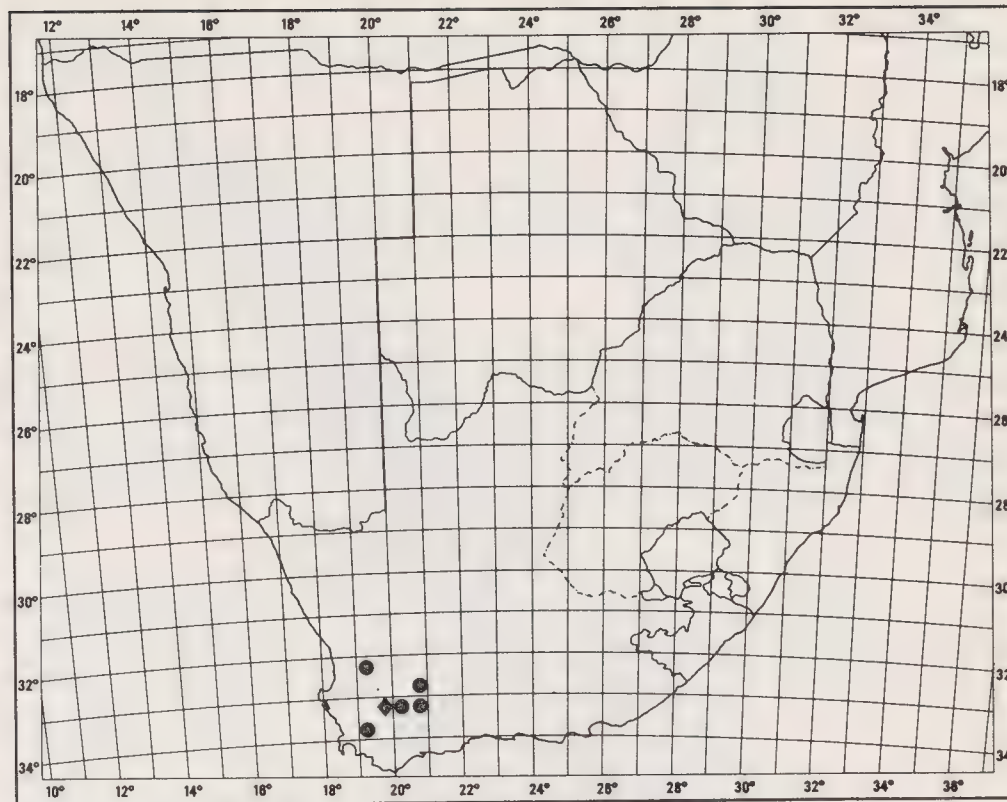
Vouchers: *Cooper* 1739 (BM; NH; PRE); *Esterhuysen* 13946 (BOL; NBG; PRE); *Giess* 11688 (NBG; PRE; WIND); *Schelte* 4831 (BM; BOL; MO; P; PR); *Schlechter* 2726 (BM; GRA; PRE).

7. *Cheilanthes depauperata* Bak. in Ann. Bot. 5: 210 (1891); Sim, Ferns S. Afr. edn 2: 226, t. 94 fig. 1 (1915); W. B. G. Jacobsen, Ferns Sthn Afr. 249, t. 179 (1983); N. C. Anthony in Contr. Bolus Herb. 11: 56, t. 11 (1984). Type: Cape Province, borders of the Karroo, *Barkly* s.n. (K, holo.!—BOL, microfiche!; BOL!, SAM!, ? iso.).

Rhizome creeping, up to 5 mm in diameter, set with appressed, entire, atrocastaneous rhizome-scales c.  $3 \times 0,25$  mm with pale brown margins. *Fronde* tufted, erect, coriaceous; *stipe* shallowly sulcate, castaneous, appearing viscid; *lamina* narrowly linear, c.  $170 \times 14$  mm, 2-pinnate to 3-pinnatifid; *pinnae* up to 10 mm long, divided into two 2- or 3-lobed pinnules and a 3- to 5-lobed terminal pinnule; *pinnule lobes* oblong-lanceolate with crenate, recurved margins, upper surface subglabrous, under surface covered with a viscid mass of matted yellowish hairs; *venation* obscure; *rhachis* sulcate, atrocastaneous, set with short, white viscid hairs; *secondary rhachises* terete. *Sori* borne beneath the revolute pinnule margin; *indusium* absent. Fig. 36: 2.

Endemic to south-western Cape Province. In dry, rocky areas and in rock crevices, often on north aspect slopes, c. 500–1 300 m altitude. Map 96.

Vouchers: *Schelte* 5918 (B; BM; BOL; C; GH; K; M; MO; NBG; NU; P; PR; PRE; S; STE); *Schlechter* 8704 (BM; BOL; BR; GRA; NH; PRE).



MAP 96.—● *Cheilanthes depauperata*  
◆ *Cheilanthes depauperata* and *Cheilanthes depauperata* × *Cheilanthes contracta* hybrid

*C. depauperata* × *C. contracta*

A putative hybrid between *C. depauperata* Bak. and *C. contracta* (Kunze) Mett. ex Kuhn (below) has been found at Karoo Poort in the Ceres District. At this locality the only other cheilanthoid ferns found were the postulated parents.

Rhachis flattened or slightly sulcate ventrally. Pinnae divided into five or more lobed pinnules.

South-western Cape Province. Around boulder bases at foot of north-facing slopes. Known from one large colony only. Map 96.

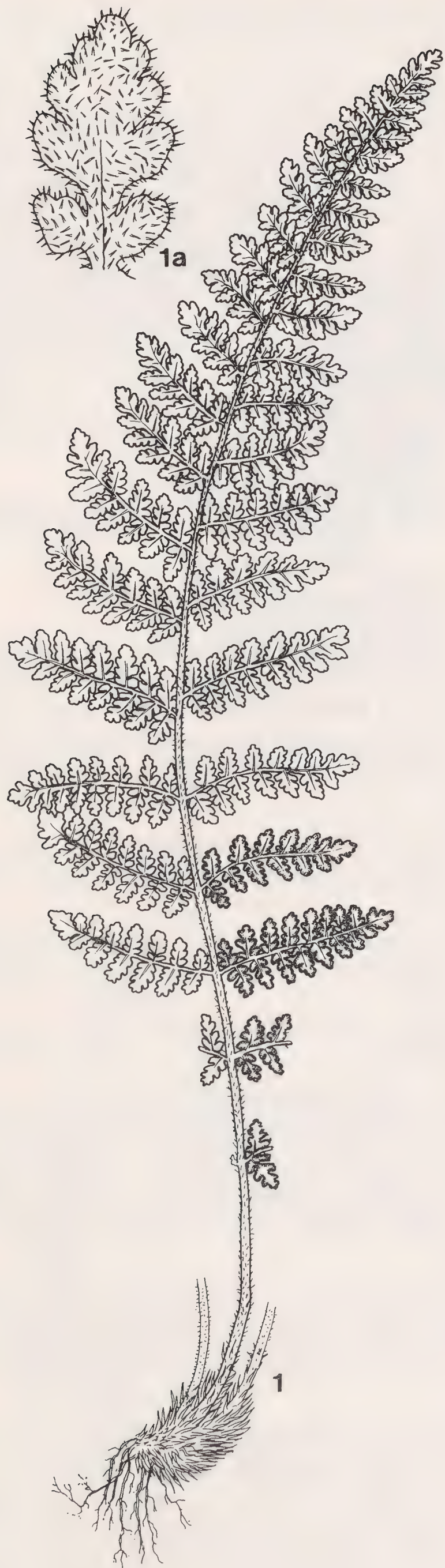
Voucher: *Schelte* 5924 (B; BOL; C; GH; K; M; MO; P; PR; PRE; S).

8. *Cheilanthes contracta* (Kunze) Mett. ex Kuhn, Fil. Afr. 70 (1868); N. C. Anthony in Contr. Bolus Herb. 11: 60, t. 12 (1984). Type: Cape Province, Zwartkops River, *Drège* b (LZ, syn.†; BM, lecto.!; K!; L—BOL, photo.!; S!; SAM!).

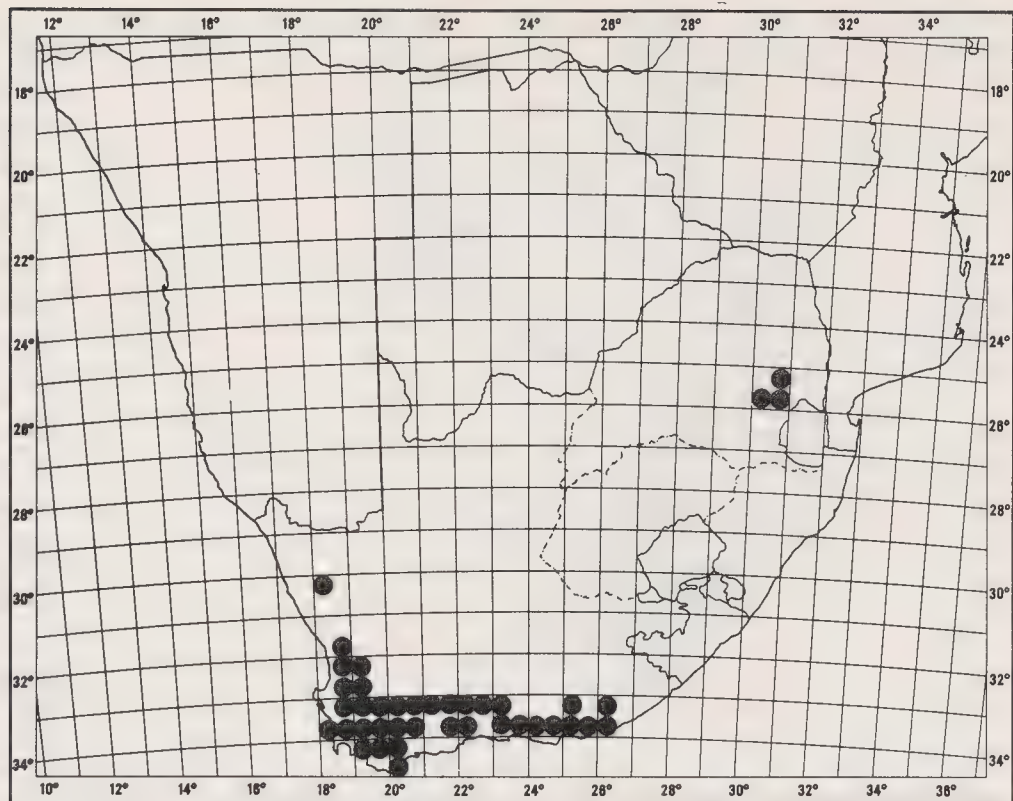
*Cheilanthes hirta* var. *contracta* Kunze in Linnaea 10: 539 (1836); Sim, Ferns S. Afr. edn 2: 229, t. 111 fig. 1 (1915); W. B. G. Jacobsen, Ferns Sthn Afr. 262, t. 66 (1983). *Myriopteris contracta* (Kunze) Fée, Gen. Fil. 149 (1852).

Rhizome creeping, up to 4 mm in diameter, set with appressed, entire, atrocastaneous rhizome-scales c.  $2 \times 0,2$  mm with narrow, pale borders and an attenuate, somewhat fimbriate, pale apex. *Fronde* spaced, erect, thinly coriaceous; *stipe* terete, castaneous to atrocastaneous, set with multicellular hairs c. 0,6 mm







MAP 97.—*Cheilanthes contracta*

long and with scales similar to rhizome-scales basally; *lamina* lanceolate, up to  $300 \times 24$  mm, 2-pinnate to 3-pinnatifid; *pinnae* lanceolate to narrowly deltate, acute, c. 14 mm long; *pinnales* divided into up to 7 lobes, both surfaces set with scattered multicellular hairs; *venation* obscure; *rhachis* and *secondary rhachises* terete, densely pilose with multicellular hairs c. 0,6 mm long. *Sori* discrete, borne on ultimate lobes, almost obscured by the revolute margin and *lamina* hairs; *indusium* minute or absent. Fig. 37: 2.

Endemic to south-western and southern Cape Province and eastern Transvaal. Around boulder bases, in arid fynbos and on rocky mountain slopes, often with a north aspect, between 60 and 1 850 m altitude. Map 97.

Vouchers: *Esterhuysen* 26885 (BM; BOL; GH; MO; P); *Louw* 2880 (PRE); *Marsh* 26 (PRE; STE); *Schelpé* 5919 (BM; BOL; GH; PR; PRE); *Snijman* 334 (NBG).

9. *Cheilanthes hirta* Swartz, Syn. Fil. 128, 329 (1806); Sim, Ferns S. Afr. edn 2: 227, t. 110 (1915); Schelpé in Contr. Bolus Herb. 1: 72 (1969); in F.Z. Pterid.: 124 (1970); in C.F.A. Pterid.: 102 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 261, t. 5 (1983); N. C. Anthony in Contr. Bolus Herb. 11: 68, t. 14 (1984). Type: Mauritius, *Grondal* s.n., Herb. Gastrom (S, lecto.!).

*Adiantum hirtum* (Swartz) Poir. in Lam., Encycl., Suppl. 1: 142 (1810). *Notholaena hirta* (Swartz) J. Sm. in J. Bot., Lond. 4: 50 (1841). *Myriopteris hirta* (Swartz) J. Sm., Ferns Brit. and Foreign 174 (1866).

*Adiantum caffrorum* Swartz in J. Bot., Gött. 1800, 2: 85 (1801), non L. f. (1781).

*Notholaena capensis* Spreng., Syst. Veg. 32 (1828). Type: Cape Province, Uitenhage, *Zeyher* 275 (B, iso.!-BOL, photo.!).

*Cheilanthes hirta* var. *intermedia* Kunze in Linnaea 10: 539 (1836). *Myriopteris intermedia* (Kunze) Fée, Mém. Fam. Foug. 5: 149 (1852). Type: Cape Province, Witbergen, *Drège* c (LZ, syn.†; B, lecto.!-BOL, photo.!, SAM!).

*Cheilanthes hirta* var. *laxa* Kunze in Linnaea 10: 540 (1836). Type: Cape Province, near Bokpoort and Nieuweveld, *Drège* c (LZ, syn.†; B, lecto.!-BOL, photo.!, L-BOL, photo.!, SAM!).

*Cheilanthes glandulosa* Pappe & Raws., Syn. Fil. Afr. Austr. 35 (1858), non Swartz (1817). Type from Griqualand, *Moffatt*.

*Cheilanthes nielsii* W. B. G. Jacobsen, Ferns Sthn Afr. 252, t. 182 a & b (1983). Type: Transvaal, farm Goedegelen 194R, Koperkop, *Jacobsen* 5126 (PRE!).

Rhizome very shortly creeping, c. 5 mm in diameter, set with pale, ferruginous concolorous and atrocastaneous-striped, subulate, entire rhizome-scales c.  $3,5 \times 0,3$  mm. *Fronde* tufted, erect, herbaceous; *stipe* terete, castaneous to atrocastaneous, pilose with patent multicellular hairs c. 1 mm long, and set with large, pale brown, lanceolate scales up to 6 mm long basally; *lamina* linear-lanceolate to ovate-oblong, up to  $340 \times 55$  mm, 2-pinnate to 3-pinnatifid; *pinnae* narrowly oblong to deltate, adnate or petiolulate, pinnatifid to pinnate into obtuse, crenate to pinnatifid lobes, sparsely pubescent with pale, glandular hairs on both surfaces; *venation* obscure; *rhachis* and *costae* castaneous (the latter narrowly winged by, and merging into, *lamina*), pilose with patent brownish hairs. *Sori* discrete, borne on margins of incurved pinnule lobes, minute; *indusium* minute or absent. Fig. 37: 1.

Widespread in Southern Africa and also in Angola, Zimbabwe, Mozambique, Kenya, Mauritius and Madagascar. Around boulder bases and in rock crevices, usually on south aspect slopes, from 250 to 2 600 m altitude. Map 98.

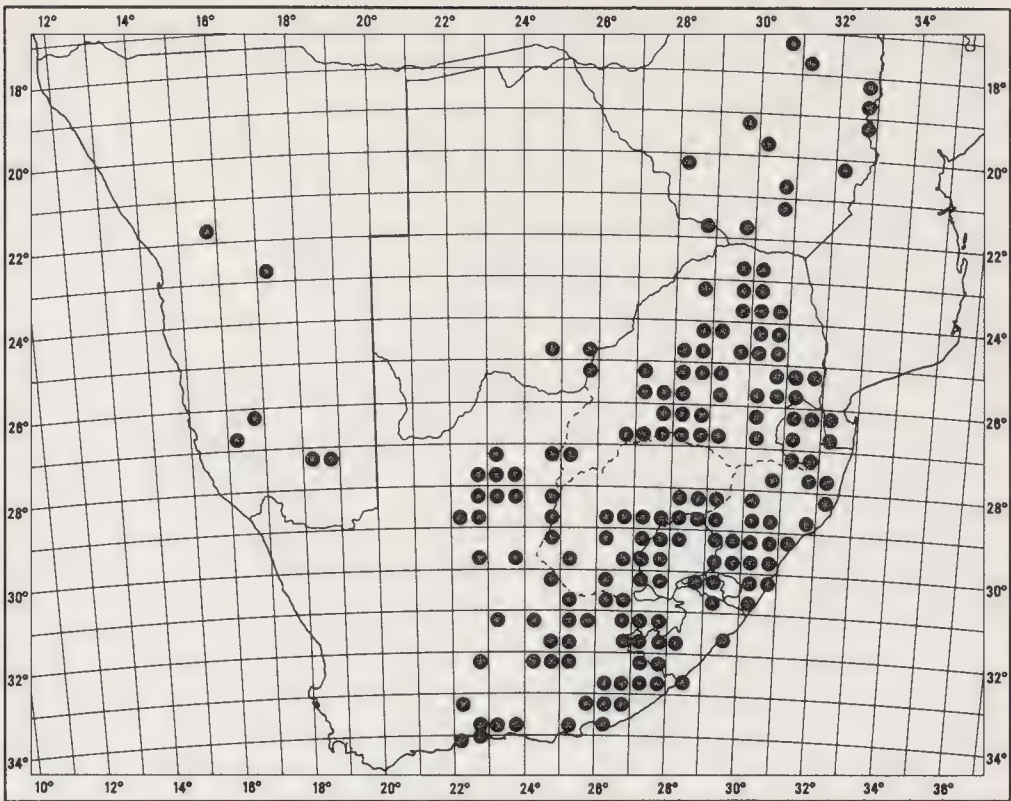
Vouchers: *Bacock* s.n. (B; BM; BOL; GH; MO; PRE); *Esterhuysen* 22962 (BM; BOL; MO; P; PR); *Schelpé* 5889 (BM; BOL; GH; PR; PRE); 5905 (BM; BOL; NBG; PR); *Ward* 2131, 2375 (BOL; NPB; NU).





FIG. 38.—1, *Cheilanthes kunzei*, part of plant,  $\times 0,6$  (Schelpe 4859). 2, *C. deltoidea*, part of plant,  $\times 0,6$  (Oliver & Muller 6426). 3, *C. robusta*, part of plant,  $\times 0,6$  (Acocks 16441). 4, *C. hastata*, part of plant,  $\times 0,6$  (Acocks 22715).



MAP 98.—*Cheilanthes hirta*

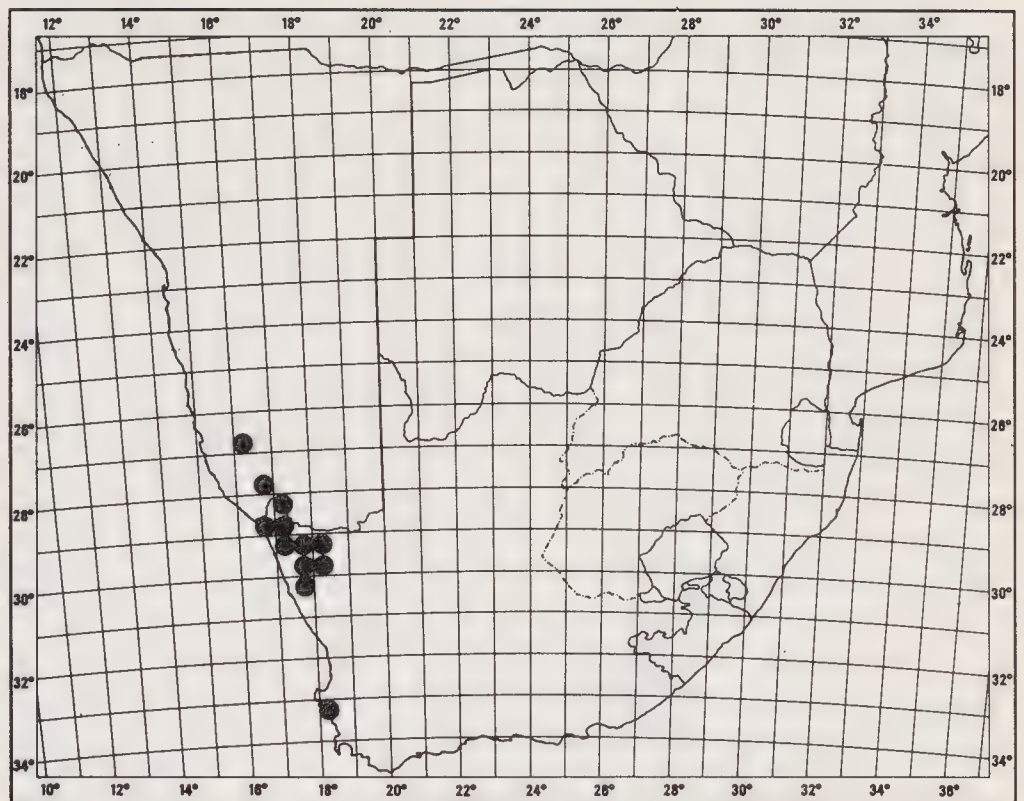
10. *Cheilanthes robusta* (Kunze) Tryon in Contr. Gray Herb. Harv. 143: 72 (1942); N. C. Anthony in Contr. Bolus Herb. 11: 83, t. 15 (1984). Type: Cape Province, Namaqualand near Goedemanskraal, Drège s.n. (LZ, holo.†; SAM, lecto.†; BM!; K!–BOL, microfiche!; NY).

*Allosorus robustus* Kunze in Linnaea 10: 502 (1836). *Onychium robustum* (Kunze) Fée in Mém. Fam. Foug. 5: 132 (1852). *Cryptogramma robusta* (Kunze) Pappe & Raws., Syn. Fil. Afr. Austr. 32 (1858). *Pellaea robusta* (Kunze) Hook., Sp. Fil. 2: 147 (1858); W. B. G. Jacobsen, Ferns Sthn Afr. 281, t. 203 (1983). *Doryopteris robusta* (Kunze) Diels in Engl., Pflanzenfam. 1, 4: 269 (1899); Sim, Ferns S. Afr. edn 2: 217, t. 105 fig. 3 (1915).

Rhizome creeping, up to 5 mm in diameter, set with ferrugineous, lanceolate, acuminate, entire, concolorous rhizome-scales often paler in the upper half, and linear, acuminate, striped rhizome-scales c. 4 mm long. *Fronde*s erect, coriaceous, up to 100 mm long; *stipe* castaneous, glabrous, upper half very shallowly sulcate; *lamina* oblong-ovate to narrowly deltate, 30–70 × 3–25 mm, 3-pinnatifid; *ultimate segments* crowded, narrowly hastate to ovate, subacute, decurrent, up to 4 × 2 mm, glabrous on both surfaces; *venation* obscure; *rhachis* sulcate, brown, glabrous. *Sori* marginal; *indusium* linear, green to pale, minutely and irregularly erose, together with folded margin up to 0.5 mm broad. Fig. 38: 3.

Endemic to Namaqualand and southern South West Africa/Namibia. On exposed gravelly soils derived from decomposed granite, up to 770 m. Map 99.

Vouchers: Compton 20670 (BOL; NBG); Moffett 3308 (STE); Schlechter 11218 (BOL; GRA; PRE); Scully 5 (BOL; PRE); Thompson & Le Roux 387 (BOL).

MAP 99.—*Cheilanthes robusta*

11. *Cheilanthes hastata* (L.f.) Kunze in Linnaea 10: 532 (1836); N. C. Anthony in Contr. Bolus Herb. 11: 86, t. 16, 17 (1984). Type: Cape of Good Hope (LINN 1252/4, holo.!).

*Adiantum hastatum* L.f., Suppl. 447 (1781). *Pteris hastata* (L.f.) Swartz in J. Bot., Gött. 1800, 2: 69 (1801), non Thunb. (1800). *Allosorus hastatus* (L.f.) Presl, Tent. Pterid. 153 (1836). *Cassebeera hastata* (L.f.) J. Sm. in J. Bot., Lond. 4: 159 (1841). *Pellaea hastata* (L.f.) Link, Fil. Sp. Hort. Berol. 60 (1841); Schelpe in J. S. Afr. Bot. 29: 93 (1963); W. B. G. Jacobsen, Ferns Sthn Afr. 282, t. 62, 204 (1983). *Platyloma hastata* (L.f.) Lowe, Ferns 3: t. 32 (1857).

*Adiantum auriculatum* Thunb., Prodr. 173 (1800). *Pteris auriculata* (Thunb.) Swartz in J. Bot., Gött. 1800, 2: 69 (1801). Type: Cape of Good Hope, Herb. Thunberg (UPS, holo.!).

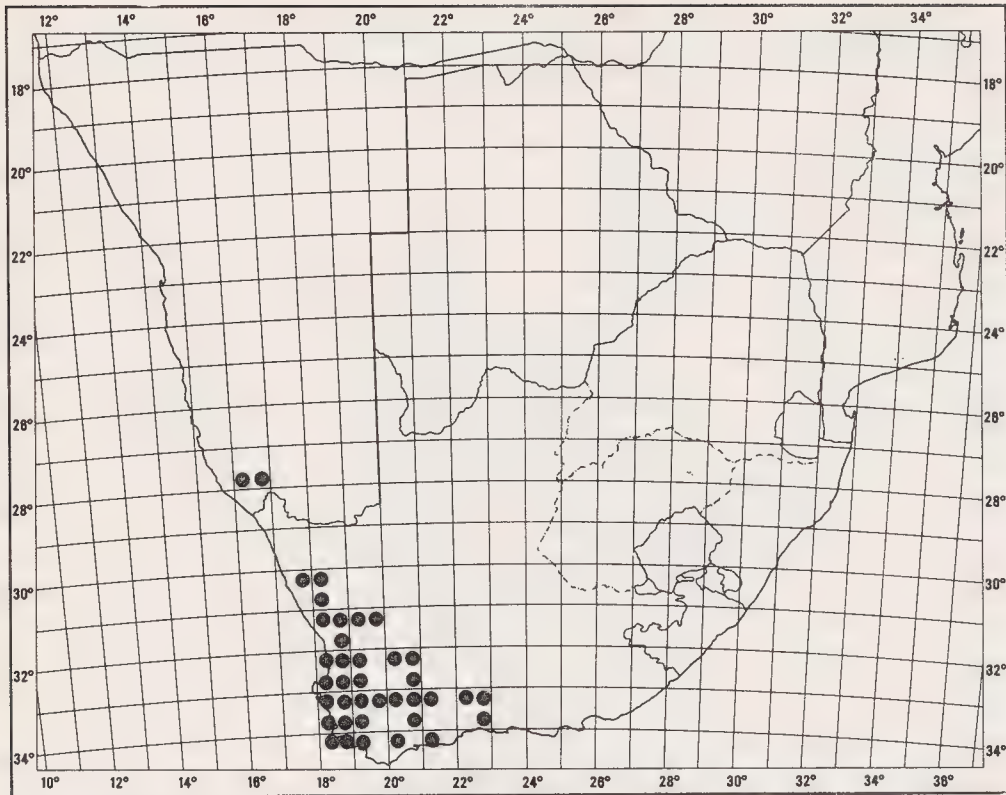
*Pteris auriculata* Thunb., Prodr. 172 (1800). *Cheilanthes auriculata* (Thunb.) Link, Hort. Reg. Bot. Berol. 2: 36 (1833). *Allosorus auriculatus* (Thunb.) Presl, Tent. Pterid. 153 (1836). *Cassebeera auriculata* (Thunb.) J. Sm. in Bot. Mag. 72, Comp. 20 (1846). *Pellaea auriculata* (Thunb.) Fée, Mém. Fam. Foug. 5: 129 (1852); Sim, Ferns S. Afr. edn 2: 199, t. 89 (1915). Type: Cape of Good Hope, Herb. Thunberg β (UPS, holo.!).

*Pteris varia* Swartz in J. Bot., Gött. 1800, 2: 69 (1801). Type: Cape of Good Hope (Type not found).

*Pellaea lancifolia* Bak. in J. Bot., Lond. 1874: 199 (1874); in Ann. Bot. 5: 214 (1891); Sim, Ferns S. Afr. edn 2: 201, t. 91 fig. 2 (1915). *Allosorus lancifolius* (Bak.) Kuntze, Rev. Gen. 2: 806 (1891). Type: Cape Province, Namaqualand, H. Barkly s.n. (K, holo.†; GRA!–BOL, illustr.†; SAM!).

Rhizome suberect to shortly creeping, up to 6 mm in diameter, set with lanceolate, acuminate, entire, concolorous pale brown rhizome-scales up to 8 mm long. *Fronde*s erect or arching, herbaceous; *stipe* castaneous, upper



MAP 100.—*Cheilanthes hastata*

half sulcate, glabrous at maturity except for a tuft of pale brown to ferruginous scales basally; *lamina* linear-lanceolate to narrowly elliptic, up to 300 mm long and 60 mm broad, apices of *ultimate segments* acute or obtuse, margins crenate; *venation* obscure in mature fronds growing in exposed conditions; *rhachis* shallowly sulcate, castaneous, glabrous, not winged by lamina in lower half. *Sori* marginal, linear; *indusium* firmly membranous, often folded under the revolute, corrugate-crenate lamina margin, together with margin 0.5–1.5 mm broad. Fig. 38: 4.

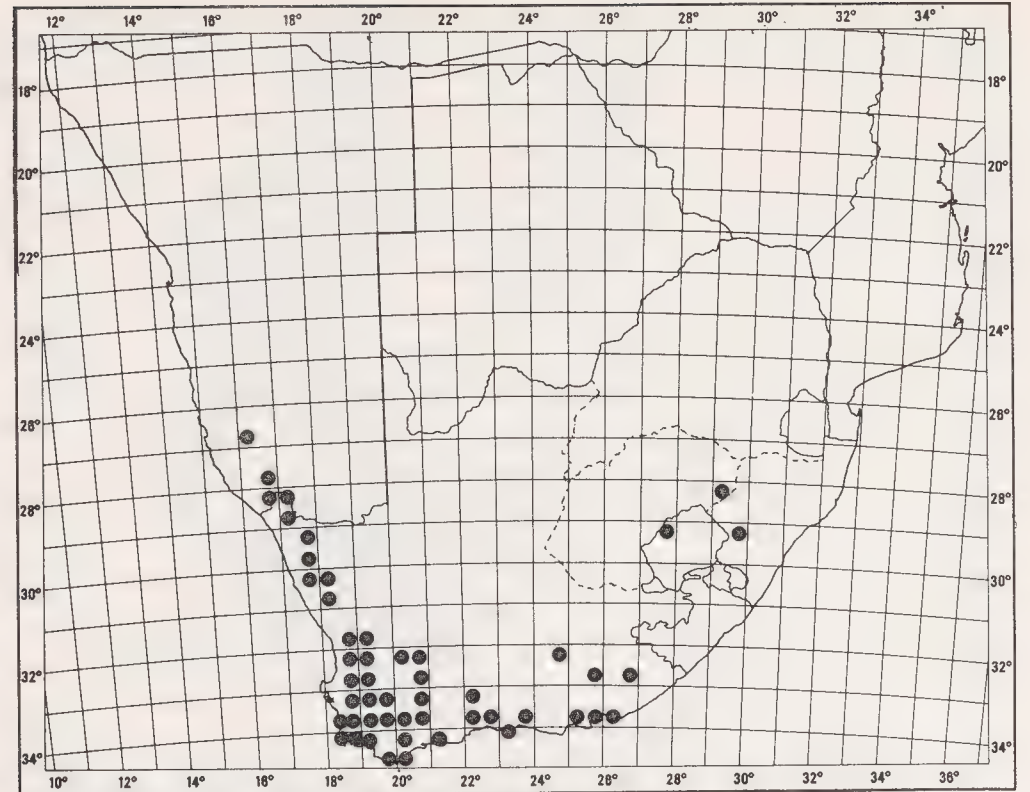
Endemic to Cape Province and southern South West Africa/Namibia. On shaded earth banks, sheltered rock crevices and under small bushes, 130–1 700 m. Map 100.

Vouchers: *Barker* 9703 (NBG; STE); *Compton* 24134 (BOL; NBG); *Esterhuysen* 17079a (BOL; PRE); *Merxmüller & Giess* 32238 (PRE; WIND); *Schlechter* 8205 (BOL; PRE).

*C. hastata* exhibits a wide variation in frond dissection from simply pinnate to deeply 2-pinnatifid. However, variation is continuous and macromorphologically this taxon must be considered as a single variable species. In addition 2 different spore types exist, the uniformly reticulate form previously being referred to var. *reticulata* Schelpe. Putative hybrids between *C. hastata* and *C. capensis* (Thunb.) Swartz have also been found.

**12. *Cheilanthes capensis* (Thunb.) Swartz**, Syn. Fil. 128 (1806); W. B. G. Jacobsen, Ferns Sthn Afr. 257, t. 181 (1983); N. C. Anthony in Contr. Bolus Herb. 11: 96, t. 19 (1984). Type: Cape of Good Hope, *Thunberg* s.n. (UPS, holo.!, LD!, ?iso.).

*Adiantum capense* Thunb., Prodr. 173 (1800). *Adiantopsis capensis* (Thunb.) Fée, Gen. Fil. 145 (1852); Sim, Ferns S. Afr. edn 2: 218, t. 106 fig. 1 (1915). *Hypolepis capensis* (Thunb.) Hook., Sp. Fil. 2: 71, t. 77C (1852).

MAP 101.—*Cheilanthes capensis*

*Cheilanthes praetexta* Kaulf., Enum. Fil. 212 (1824). Type: Cape of Good Hope, *Kaulfuss* s.n. (?LE, holo.; E!).

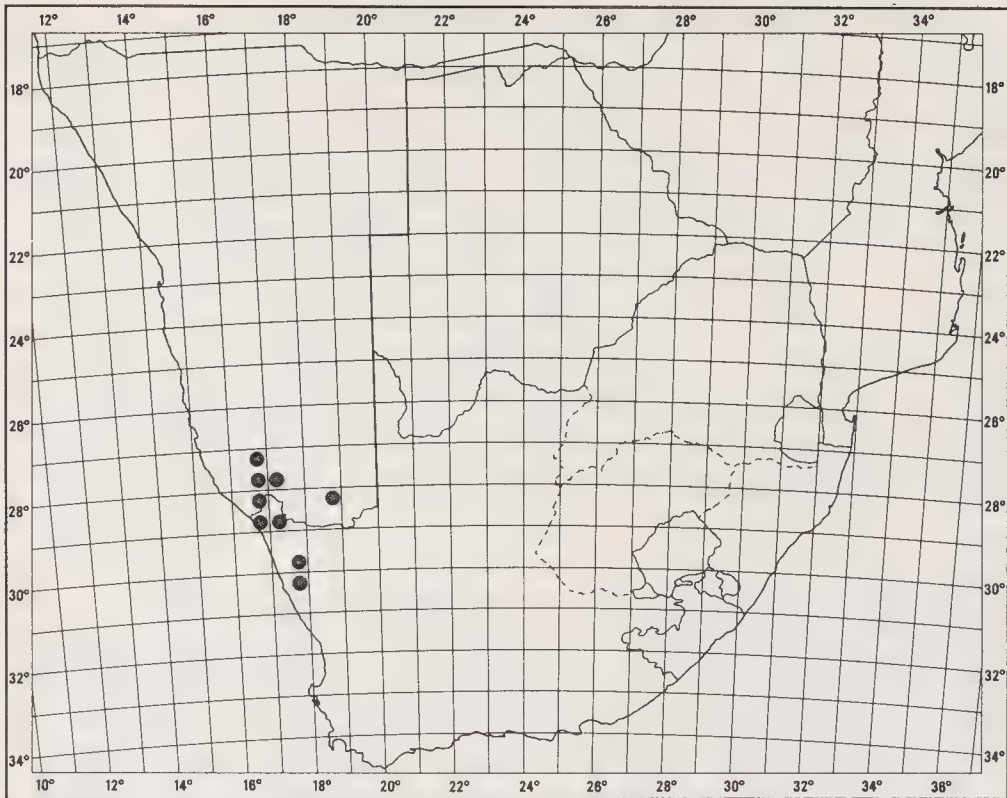
Rhizome creeping, up to 3 mm in diameter, set with entire, lanceolate-acuminate, concolorous light brown rhizome-scales c.  $4 \times 0.7$  mm. *Fronds* erect to arching, herbaceous; *stipe* castaneous, nitid, upper half sulcate, glabrous except for occasional hairs and set with pale brown scales basally; *lamina* broadly ovate-deltate to trullate, c.  $120 \times 70$  mm, 3-pinnatifid, basal pinnae largest and developed basiscopically; *pinnae* oblong to deltate; *ultimate segments* rotund to oblong-deltate, serrate-crenate, glabrous on both surfaces except for occasional scales along costae and costules; *venation* free, obscure above; *rhachis* and *secondary rhachises* sulcate, castaneous, narrowly winged, glabrous except for scattered piliform scales. *Sori* discrete, borne on vein-endings at margin, between marginal crenations or teeth; *indusia* discontinuous, erose to lacerate, up to 1 mm broad.

Endemic to Southern Africa, confined predominantly to South-western Cape Province but distributed as far east as Natal and as far north as the Witputz District of South West Africa/Namibia. In rock crevices and around boulder bases, usually on south aspect slopes, 200–1 850 m. Map 101.

Vouchers: *Boucher* 4424, 4693 (STE); *Giess* 13042 (PRE; WIND); *Pearson* 6182, 6633 (BOL); *Schelpe* 4704, 4709 (BOL); *Steyn* 220 (NBG).

**13. *Cheilanthes kunzei* Mett.**, Farngatt. 5: 71, n. 22, t. 3 figs 6, 7 (1859); N. C. Anthony in Contr. Bolus Herb. 11: 13, t. 21 (1984). Type: Cape Province, Namaqualand, Zilverfontein, *Drège* s.n. (LZ, holo. †; B, lecto. !—BOL, photo.!).





MAP 102.—*Cheilanthes kunzei*

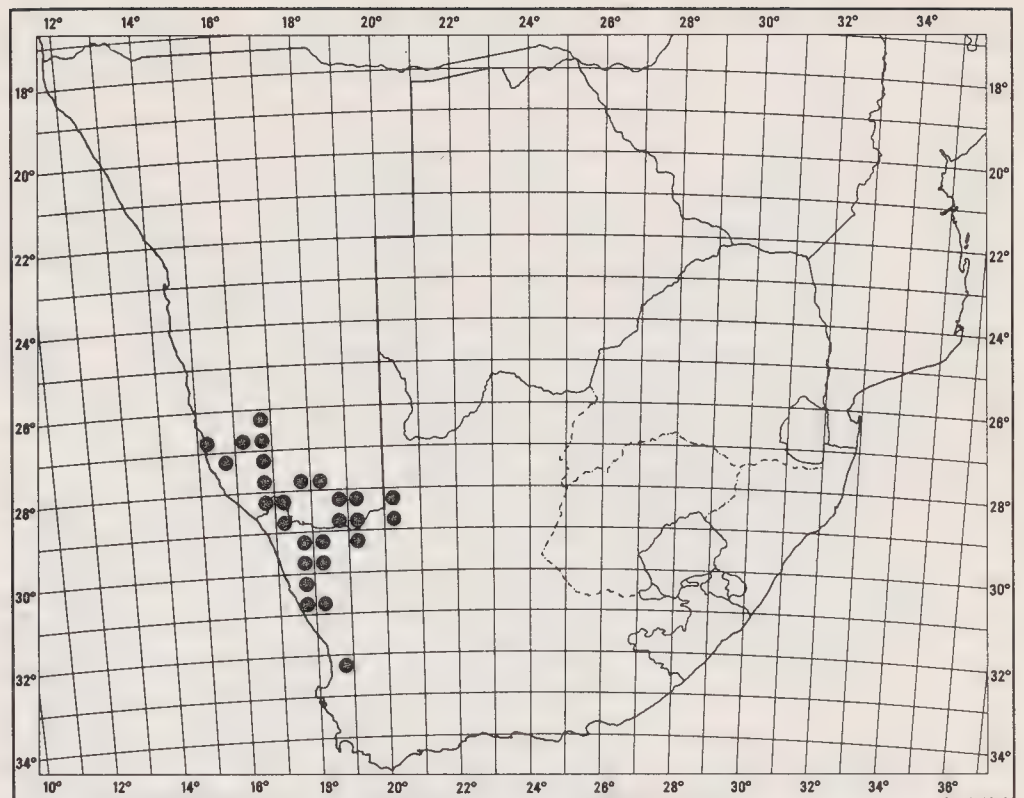
*Cheilanthes profusa* var. *minor* Kunze in Linnaea 10: 535 (1836). *Pellaea hastata* var. *minor* (Kunze) Schelpe in Jl S. Afr. Bot. 35: 133 (1969). Type as above.

Rhizome shortly creeping, c. 2,5 mm in diameter, often obscured by persistent stipe bases, set with entire, lanceolate-acuminate, pale brown concolorous and striped rhizome-scales c. 3 mm long. *Fronde*s arching, thinly carnose-coriaceous to herbaceous; *stipe* castaneous, nitid, shorter than lamina, sulcate in upper half, glabrous except for a few scales basally; *lamina* narrowly to broadly ovate-acute, pinnate to 3-pinnatifid, lower pinnae reduced; *pinnae* ovate to oblong, acute, often adnate acroscopically; *ultimate segments* deltate or oblong-obtuse, glabrous on both surfaces; *venation* obscure; *rhachis* sulcate, castaneous, not usually winged except near the apex, sparsely set with pale scales and multicellular hairs. *Sori* borne on vein endings at margins of ultimate segments, often appearing continuous at maturity; *indusium* greenish to pale, irregular, c. 0,3 mm in diameter. Fig. 38: 1.

Endemic to southern South West Africa/Namibia and Namaqualand. Around rocks and in shaded rock crevices, c. 600–1 000 m. Map 102.

Vouchers: Giess 14610, 14651 (WIND); Schelpe 4859 (B; BOL; C; GH; K; M; MO; P; PR; PRE; S); Schelpe 8010 (BOL; GH; K; PRE; STE); Williamson 2360 (BOL).

14. *Cheilanthes deltoidea* Kunze in Linnaea 10: 535 (1836); N. C. Anthony in Contr. Bolus Herb. 11: 109, t. 22 (1984). Type: Cape Province, Namaqualand, Zilverfontein, Drège



MAP 103.—*Cheilanthes deltoidea*

s.n. (LZ, holo.†; K, lecto.!–BOL, microfiche!; B!–BOL, photo.!).

*Pellaea deltoidea* (Kunze) Bak. in Hook. & Bak., Syn. Fil. 146 (1868); W. B. G. Jacobsen, Ferns Sthn Afr. 280, t. 201 (1983). *Allosorus deltoideus* (Kunze) Kuntze, Rev. Gen. 2: 806 (1891). *Doryopteris deltoidea* (Kunze) Diels in Engl., Pflanzenfam. 1, 4: 269 (1899); Sim, Ferns S. Afr. edn 2: 216, t. 105 fig. 1 (1915).

*Doryopteris deltoidea* var. *laxa* Sim, Ferns S. Afr. edn 2: 217, t. 105 fig. 2 (1915). Type: Cape Province, Namaqualand, between O'okiep and Nababeep, Bolus 9463 (PRE, holo.!–BOL, photo.!!; BOL!; K!–BOL, microfiche!).

Rhizome creeping, up to 4 mm in diameter, set with ferrugineous-castaneous, concolorous, lanceolate-attenuate, entire rhizome-scales c. 3 mm long. *Fronde*s erect, herbaceous to thinly carnose-coriaceous; *stipe* sulcate, slender, castaneous, glabrous; *lamina* broadly deltate, 18–100 × 16–110 mm broad, 3-pinnatifid (2-pinnatifid in depauperate fronds), basal pinnae largest and developed basiscopically; *ultimate segments* oblong acute in fertile fronds, obtuse in sterile or partially sterile fronds, glabrous; *venation* obscure; *rhachis* castaneous, glabrous, winged for its whole length. *Sori* linear; *indusium* continuous, pale membranous, minutely erose, c. 0,4 mm broad. Fig. 38: 2.

Endemic to Namaqualand and southern South West Africa/Namibia. In rock crevices, usually on south aspects, at altitudes between 140 and 1 200 m. Map 103.

Vouchers: Giess 10337 (WIND); Hugo 2808 (STE); Pearson 3176 (BOL; PRE); Schelpe 4857, 4873 (B; BOL; C; GH; K; M; MO; P; PR; PRE; S); Van Jaarsveld 6748 (NBG).







15. **Cheilanthes namaquensis** (Bak.) Schelpe & N. C. Anthony in Contr. Bolus Herb. 10: 155 (1982); N. C. Anthony in Contr. Bolus Herb. 11: 115, t.23 (1984). Type: Cape Province, Namaqualand, *H. Barkly* s.n. (K, holo.!-BOL, microfiche!; GRA; SAM!).

*Pellaea namaquensis* Bak. in J. Bot., Lond. 1874: 199 (1874); in Ann. Bot. 5: 214 (1891); Sim, Ferns S. Afr. edn 2: 205, t. 94 fig. 2 (1915); W. B. G. Jacobsen, Ferns Sthn Afr. 280, t. 202 (1983). *Allosorus namaquensis* (Bak.) Kuntze, Rev. Gen. 2: 806 (1891).

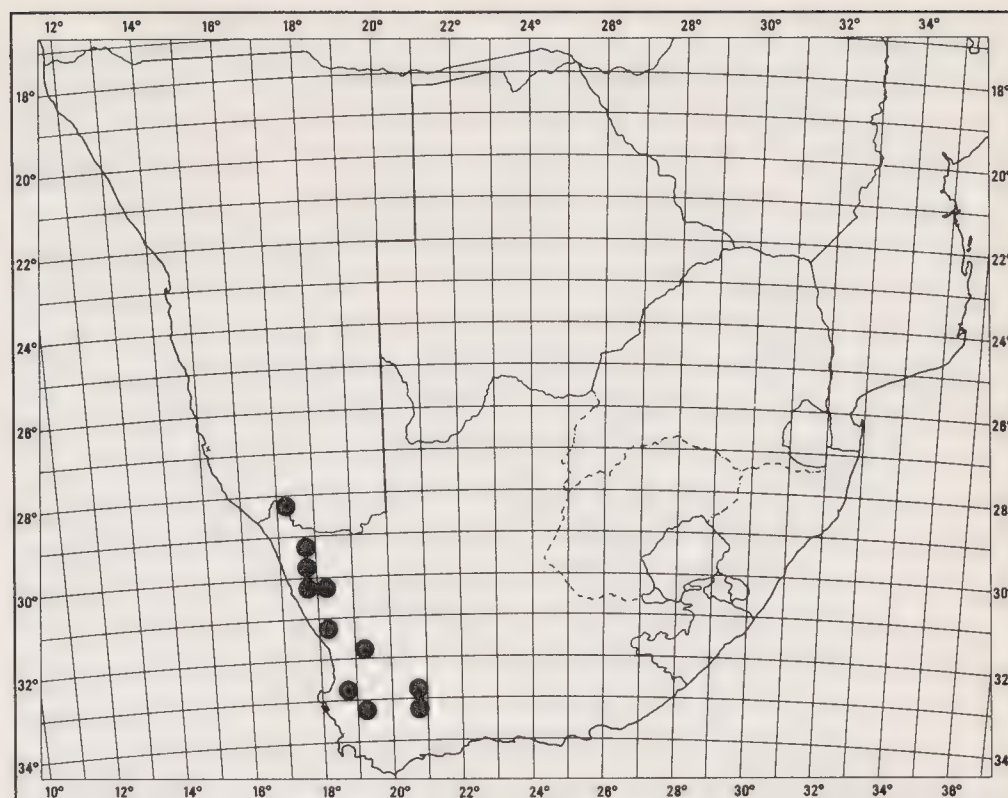
Rhizome creeping, c. 2,5 mm in diameter, often obscured by persistent stipe bases, set with dark reddish-castaneous, nitid, lanceolate-acuminate, entire, concolorous and striped rhizome-scales c. 3,5 mm long. *Fronde*s erect, thinly carnose-coriaceous, up to 200 mm long; *stipe* atrocastaneous to ebeneous, nitid, shallowly sulcate in upper half, often longer than lamina, set with reddish scales basally and usually scattered dark scales smaller than rhizome-scales; *lamina* oblong-ovate to deltate, c. 60 × 25 mm, 3-pinnatifid (4-pinnatifid in larger specimens); *basal pinnae* largest, broader basis-copically, sometimes adnate acroscopically; *ultimate segments* oblong-obtuse to somewhat hastate, glabrous except for very occasional scales below; *venation* obscure; *rhachis* sulcate, the sulca rounded in cross-section, not usually winged by lamina immediately above basal pinnae. *Sori* borne on outer margins of ultimate segments; *indusium* greenish to pale, erose, together with involute margin c. 0,5 mm in diameter. Fig. 39: 1.

Endemic to western Cape Province and southern South West Africa/Namibia. In rock crevices, often on north aspect slopes, c. 300–650 m. Map 104.

Vouchers: *Esterhuysen* 26021 (BOL; PRE); *Pillans* 5976 (BOL); *Roux* 329 (NBG); *Schelpe* 4958 (B; BOL; C; GH; K; M; MO; P; PR; PRE; S); *Schlechter* 8278 (BM; BOL; GRA; PRE).

16. **Cheilanthes dolomiticola** (Schelpe) Schelpe & N. C. Anthony in Contr. Bolus Herb. 10: 155 (1982); N. C. Anthony in Contr. Bolus Herb. 11: 120, t. 24 (1984). Type: Cape Province, Vryburg, Tiger Kloof, *Schelpe* 5885 (BOL, holo.!; B!; BM!; C!; GH!; K!; M!; MO!; NBG!; NU!; P!; PR!; PRE!; S!; STE!).

*Pellaea dolomiticola* Schelpe in Jl S. Afr. Bot. 34: 239, t. 3 (1968); W. B. G. Jacobsen, Ferns Sthn Afr. 283, t. 12 (1983).



MAP 104.—**Cheilanthes namaquensis**

Rhizome suberect, c. 4 mm in diameter, set with pale brown, entire, lanceolate, acuminate rhizome-scales up to 4 × 0,75 mm. *Fronde*s erect to spreading, thinly coriaceous; *stipe* sulcate, atrocastaneous, nitid, set with pale brown, entire to serrulate scales up to 4 × 1,2 mm; *lamina* broadly elliptic to rotund, up to 85 × 40 mm, 2-pinnate to 3-pinnatifid, basal pinnae reduced and developed basis-copically; *pinnae* unequally oblong-ovate, acute, up to 20 × 12 mm, developed basis-copically; *pinna segments* usually narrowly to broadly hastate, glabrous or set with pale brown, serrulate scales along costules below; *venation* obscure; *rhachis* and *secondary rhachises*, sulcate, castaneous, densely to thinly set with pale brown, lanceolate, acuminate, serrulate scales c. 3 mm long. *Sori* marginal, linear; *indusium* green to pale, entire to erose, up to 0,3 mm broad. Fig. 39: 2.

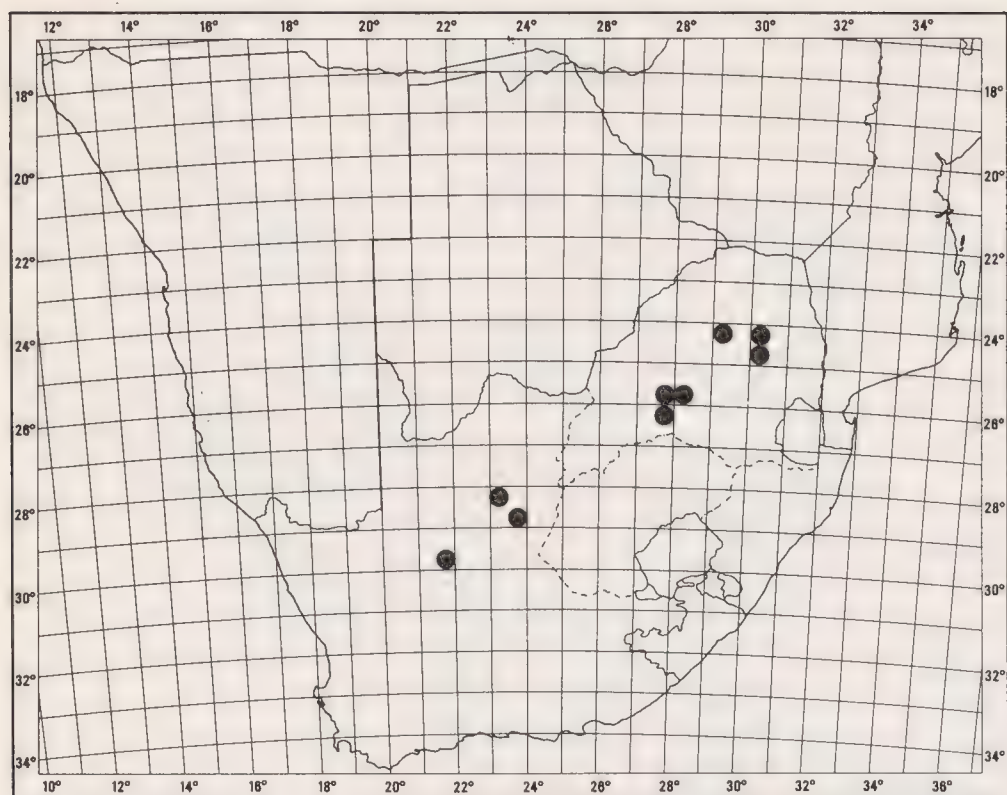
Endemic to northern Cape Province and Transvaal. *C. dolomiticola* appears to be confined to crevices in dolomitic limestone outcrops at altitudes between 1 200 and 1 900 m. Map 105.

Vouchers: *Acocks* 2269 (KMG); *Braithwaite* 244 (BOL); *Fourie* 1289 (PRE); *Kluge* 2385 (PRE); *Mogg* 22999 (BOL; PRE).

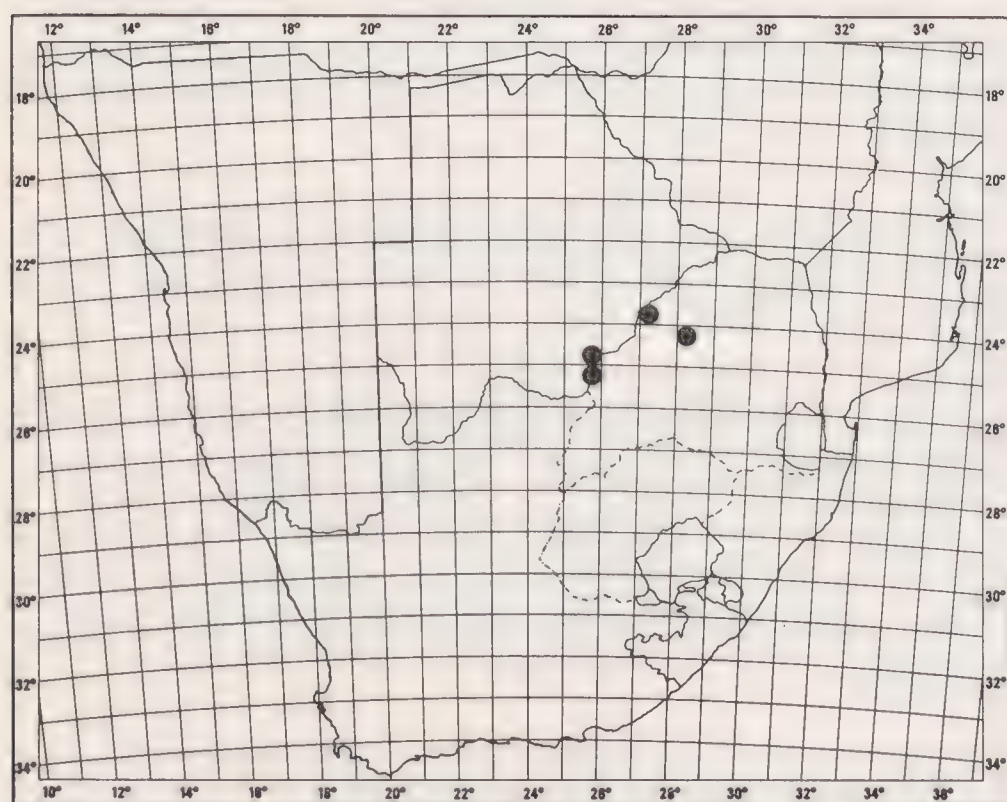
17. **Cheilanthes botswanae** Schelpe & N. C. Anthony in Contr. Bolus Herb. 10: 151 (1982); N. C. Anthony in Contr. Bolus Herb. 11: 125, t. 26 (1984). Type: Botswana, Ootse Hills, *Mott* 292 (BOL, holo.!; GH!; K!; PRE!; UBLs).

FIG. 39.—1, **Cheilanthes namaquensis**, part of plant, × 0,6; 1a, detail of lower surface of pinnule, × 5,4 (*Esterhuysen* 26021). 2, **C. dolomiticola**, part of plant, × 0,6; 2a, detail of lower surface of ultimate segments, × 5,4 (*Schelpe* 5885). 3, **C. concolor**, part of plant, × 0,6; 3a, detail of lower surface of ultimate segments, × 5,4 (*Strey* 7158).



MAP 105.—*Cheilanthes dolomiticola*

Rhizome suberect, c. 4 mm in diameter, set with lanceolate-acuminate, entire, pale brown concolorous and ebeneous-striped rhizome-scales c. 3,5 mm long. *Fronde*s tufted, suberect; *stipe* sulcate, pale castaneous, densely set with subulate-acuminate, pale to castaneous scales up to  $3 \times 0,3$  mm; *lamina* thinly coriaceous, narrowly ovate, up to  $120 \times 50$  mm, 2-pinnate to 3-pinnatifid, basal pinnae hardly reduced and developed basiscopically; pinnae oblong-ovate, acute; *ultimate segments* narrowly hastate or oblong-acute, glabrous or set with occasional scales along costules below; *venation* free, obscure; *rhachis* and *secondary rhachises* sulcate, pale castaneous, densely set with subulate and minute filiform scales. *Sori* marginal, linear; *indusium* continuous, pale, subentire, c. 0,4 mm broad.

MAP 106.—*Cheilanthes botswanae*

Known only from south-eastern Botswana and north-western Transvaal. In dry, rocky areas, c. 1 330 m altitude. Map 106.

Vouchers: Breyer 18051 (PRE); Krantz sub TRV 762 (PRE); Mott 627 (BOL).

18. *Cheilanthes involuta* (Swartz) Schelpe & N. C. Anthony in Contr. Bolus Herb. 10: 155 (1982). Type: Cape Province, Herb. Thunberg (UPS, lecto.!-BOL, photo.!).

Lamina outline linear to lanceolate; sulca of stipe and rhachis rounded ..... (a). var. *involuta*  
Lamina outline subdeltate; sulca of stipe and rhachis flat to square ..... (b). var. *obscura*

#### 18 (a). var. *involuta*.

N. C. Anthony in Contr. Bolus. Herb. 11: 130, t. 27 (1984).

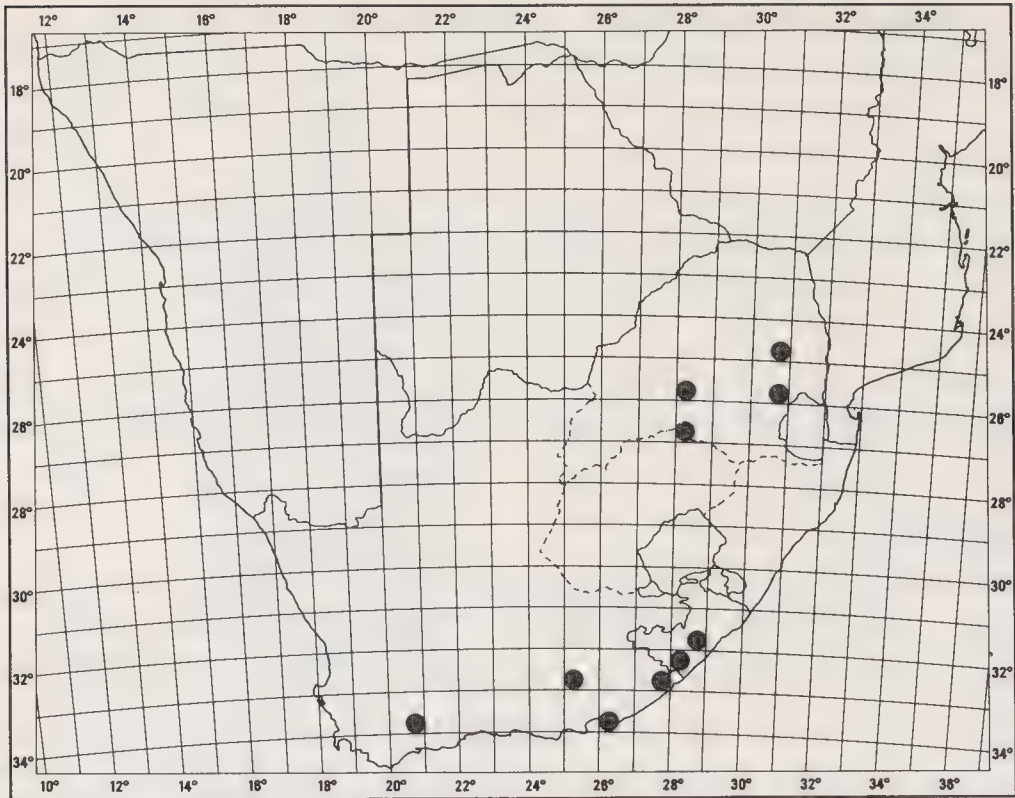
*Pteris involuta* Swartz in J. Bot., Gött. 1800, 2: 69 (1801). *Allosorus involutus* (Swartz) Presl, Tent. Pterid. 153 (1836). *Pellaea involuta* (Swartz) Bak., Syn. Fil. edn 2: 148 (1874); Sim, Ferns S. Afr. edn 2: 205 pro parte quoad t. 95 fig. 1 (1915). *Pteridella involuta* (Swartz) Mett. ex Kuhn in Von Deck., Reisen, Bot. 3, 3: 15 (1879).

*Cheilanthes cornuta* Kunze in Linnaea 10: 534 (1836). Type: Klein-Vischrievier, Drège a (LZ, syn.†; BM; HBG-BOL, photo.†; L).

*Cheilanthes hastata* forma *normalis* Kunze in Linnaea 20: 257 (1847). Type: Cape Province, Buffeljaagd River, Zeyher 4624 (W, holo.; PRE!).

Rhizome shortly creeping, c. 3 mm in diameter, set with narrowly lanceolate, attenuate, entire, pale ferrugineous, concolorous and occasionally atrocastaneous-striped rhizome-scales up to 6 mm long. *Fronde*s tufted, erect; *stipe* sulcate, atrocastaneous, about as long as lamina, densely set with patent, subulate, acuminate, brown scales up to 3 mm long as well as minute one- or two-celled hairs; *lamina* thinly carnose-coriaceous, linear to lanceolate, up to  $160 \times 40$  mm, 2-pinnate to 3-pinnatifid, basal pinnae usually reduced; *pinnae* unequally subdeltate, acute; *ultimate segments* unequally oblong-hastate, glabrous ventrally, set with subulate-acuminate pale scales along costules below; *venation* free, obscure; *rhachis* and *secondary rhachises* sulcate, atrocastaneous, set with numerous subulate-acuminate and minute filiform scales. *Sori* borne along proximal margins of ultimate segments, linear; *indusium* continuous, pale to greenish, up to 0,3 mm broad. Fig. 40: 1.





MAP 107.—*Cheilanthes involuta* var. *involuta*

Southern Cape Province, Transkei and Transvaal, as well as a single collection from East Africa. On dry, rocky, shrubby slopes, c. 330 to 1 830 m altitude. Map 107.

Vouchers: *Archibald* 5766 (BOL); *Bredenkamp* 424 (PRE); *Flanagan* 1240 (BOL; PRE; SAM); *Rogers* 23579 (PRE); *Taylor* 3622 (BOL; NBG).

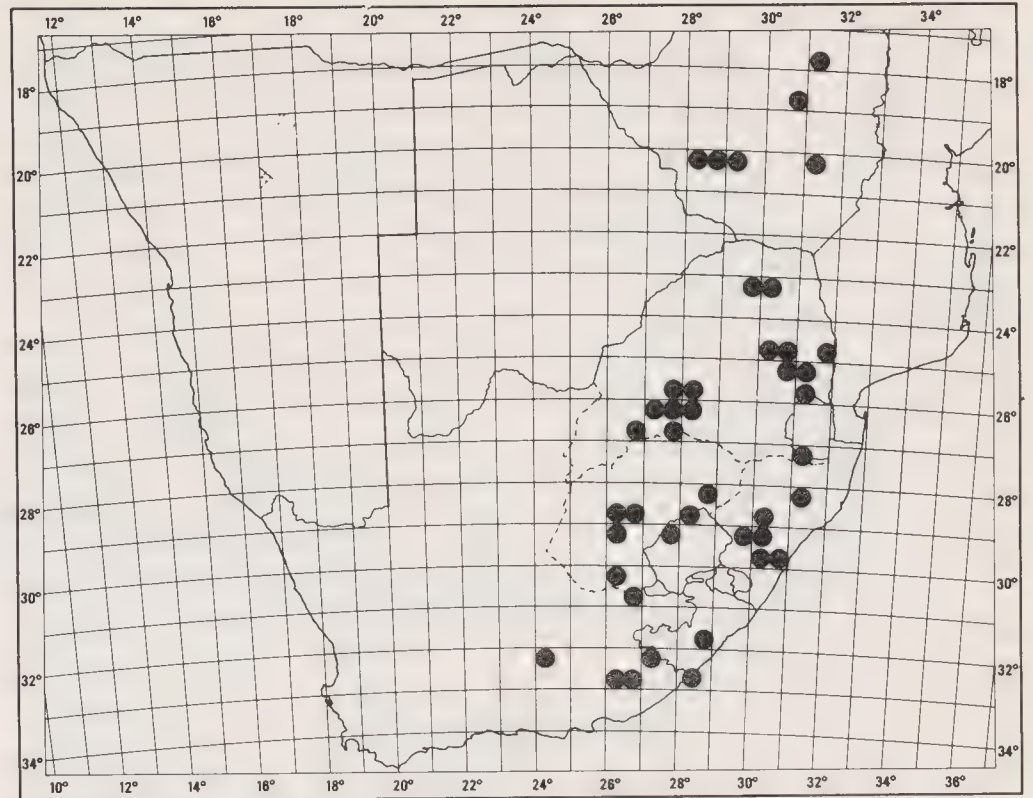
18(b). var. *obscura* (N. C. Anthony) N. C. Anthony in Contr. Bolus Herb. 11: 136, t.29 (1984). Type: Lesotho, Maseru, Devil Mountain, *Bowmaker* 59 (BOL, holo.!).

*Cheilanthes viridis* (Forssk.) Swartz var. *obscura* N. C. Anthony in Contr. Bolus Herb. 10: 154 (1982), pro parte, sensu Schelpe, F.Z. Pterid.: 136 (1970).

*Pellaea involuta* sensu Sim, Ferns S. Afr. edn 2:205, pro parte quoad t. 95 fig. 2 (1915).

*Pellaea viridis* var. *involuta* sensu Schelpe, F.Z. Pterid.: 136 (1970); sensu W. B. G. Jacobsen, Ferns Sthn Afr. 287, t. 205d (1983).

Rhizome creeping, c. 4 mm in diameter, set with lanceolate-attenuate rhizome-scales, entire to occasionally minutely serrulate, pale brown, concolorous and ebeneous-striped rhizome-scales up to 6 mm long. *Fronde*s crowded, erect to arching; *stipe* atrocastaneous, about as long as lamina, flattened or squarely sulcate, set with lanceolate, acuminate, entire, castaneous scales, c. 2 mm long, more numerous basally; *lamina* thinly carnose-coriaceous, subdeltate, c. 110 × 45 mm, basal pinnae largest and developed basiscopically; pinnae lanceolate, acute; *ultimate segments* ovate-oblong to subhastate, upper surface glabrous, under surface set with occasional lanceolate scales along costae; *venation* free, obscure; *rhachis and secondary rhachises* sulcate, atrocastaneous, set with scattered lanceolate-attenuate brown scales. *Sori*



MAP 108.—*Cheilanthes involuta* var. *obscura*

borne along proximal margins of ultimate segments, linear; *indusium* continuous, pale membranous, suberose, c. 0,2 mm broad.

South West Africa/Namibia, Botswana, eastern Cape Province, Transkei, Lesotho, Orange Free State, Natal and Transvaal, as well as Zimbabwe and Mozambique. Around rocky outcrops and boulder bases, from 400 m altitude in Transkei to 2 930 m in Lesotho. Map 108.

Vouchers: *Coetzee* 76 (PRE); *Dieterlen* 637 (PRE; SAM); *Giess* 12583 (PRE; WIND); *Truter* 55 (STE); *Van Jaarsveld* 5846 (BOL; NBG).

19. *Cheilanthes viridis* (Forssk.) Swartz, Syn. Fil. 127 (1806). Type: Arabia, *Forsskål* s.n. (Not found).

- 1a Bases of secondary rhachises and petiolules pubescent with short, unicellular to multicellular, patent hairs, sometimes extending to lower surface of lamina and costule:
- 2a Lamina 2-pinnate to 4-pinnate, pinnae up to c. 20 × 7 mm..... (a). var. *viridis*
- 2b Lamina 2- or 3-pinnate, pinnae c. 30 × 15 mm..... (b). var. *macrophylla*
- 1b Secondary rhachises and petiolules glabrous or set with filiform appressed scales..... (c). var. *glauca*

19 (a). var. *viridis*.

N. C. Anthony in Contr. Bolus Herb. 11: 144, t. 30 (1984).

*Pteris viridis* Forssk., Fl. Aegypt.-Arab. cxxiv, 186 (1775). *Adiantum viride* (Forssk.) Vahl, Symb. Bot. 3: 104 (1894). *Pteridella viridis* (Forssk.) Kuhn in Von Deck., Reisen, Bot. 3, 3: 16 (1879). *Pellaea viridis* (Forssk.) Prantl in Bot. Jb. 3: 420 (1882); Sim, Ferns S. Afr. edn 2: 207, t. 96 (1915); Schelpe in Contr. Bolus Herb. 1: 81 (1969); in F.Z. Pterid.: 133 (1970); in C.F.A. Pterid.: 109 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 284, t. 205a (1983).





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*Pteris hastaefolia* Schrad. in Gött. Gel. Anz. 1818: 917 (1818). Type: Cape of Good Hope, Hesse s.n. (LE, holo.—BOL, photo.).

*Cheilanthes hastata* var. *canonica* Kunze in Linnaea 10: 532 (1836). Type: Cape Province, Albany, at Glenfilling, Drège c (LZ, syn. †; B, lecto. †; L—BOL, photo. †).

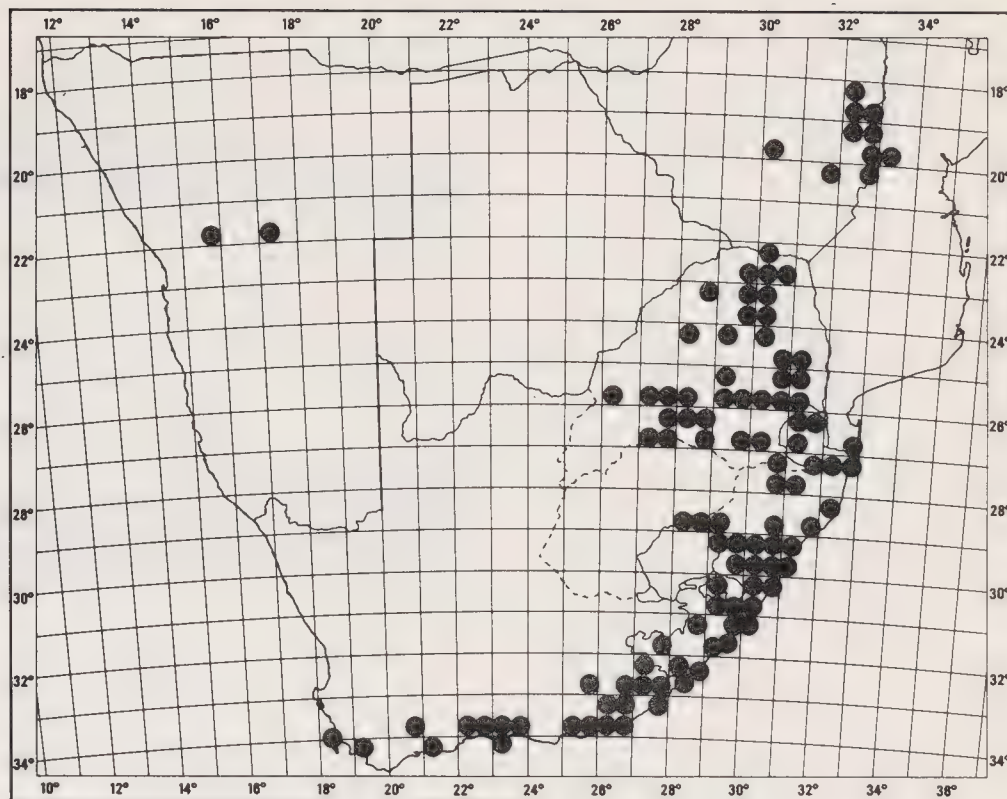
*Cheilanthes hastata* var. *stenophylla* Kunze in Linnaea 10: 533 (1836). Syntypes from Cape Province, Ecklon (LZ†).

Rhizome creeping, c. 5 mm in diameter, set with lanceolate, attenuate, serrulate, light brown to ferrugineous, concolorous or ebeneous-striped rhizome-scales c.  $3 \times 0,5$  mm. Fronds closely spaced, arching; stipe sulcate, castaneous, about as long as lamina, subglabrous at maturity except for scales similar to rhizome-scales basally; lamina herbaceous to very thinly coriaceous, broadly linear to lanceolate or broadly deltate-pentagonal, up to  $500 \times 240$  mm, dissection variable (2-pinnatifid to 5-pinnate), basal pinnae usually largest and sometimes much-developed basiscopically; pinnae oblong-deltate, acute; ultimate segments petiolulate on short pubescent petiolules except for terminal adnate segments, narrowly hastate, margins crenate, glabrous on both surfaces or pubescent below along costae and veins; venation free, apparent; rhachis and secondary rhachises broadly sulcate, castaneous, glabrous or pubescent with short hairs, always pubescent in axils. Sori borne in a marginal soral line; indusium continuous, membranous, subentire, c. 0,5 mm broad. Fig. 40: 2.

South West Africa/Namibia, Cape Province, Transkei, Lesotho, Natal, Swaziland and Transvaal, as well as Zimbabwe, Uganda, Kenya and Tanzania, Madagascar, Arabia and India. Primarily a forest margin fern, but also found in other semi-shaded habitats, from near sea level in southern Cape Province to c. 2 000 m altitude in the Natal Drakensberg. Map 109.

Vouchers: Dieterlen 546 (NH; NBG; PRE; SAM; STE); Giess 11273 (WIND); Kruger 1312 (PRE; STE); Moll 4467 (BOL; NH; PRE); Viljoen 128 (NBG; PRE).

19(b). var. *macrophylla* (Kunze) Schelpe & N. C. Anthony in Contr. Bolus Herb. 10: 155 (1982); N. C. Anthony in Contr. Bolus Herb. 11: 156, t. 32 (1984). Type: Waterfall near Umsikaba, Drège s.n. (LZ, syn. †; K, lecto. —BOL, microfiche †; B!).

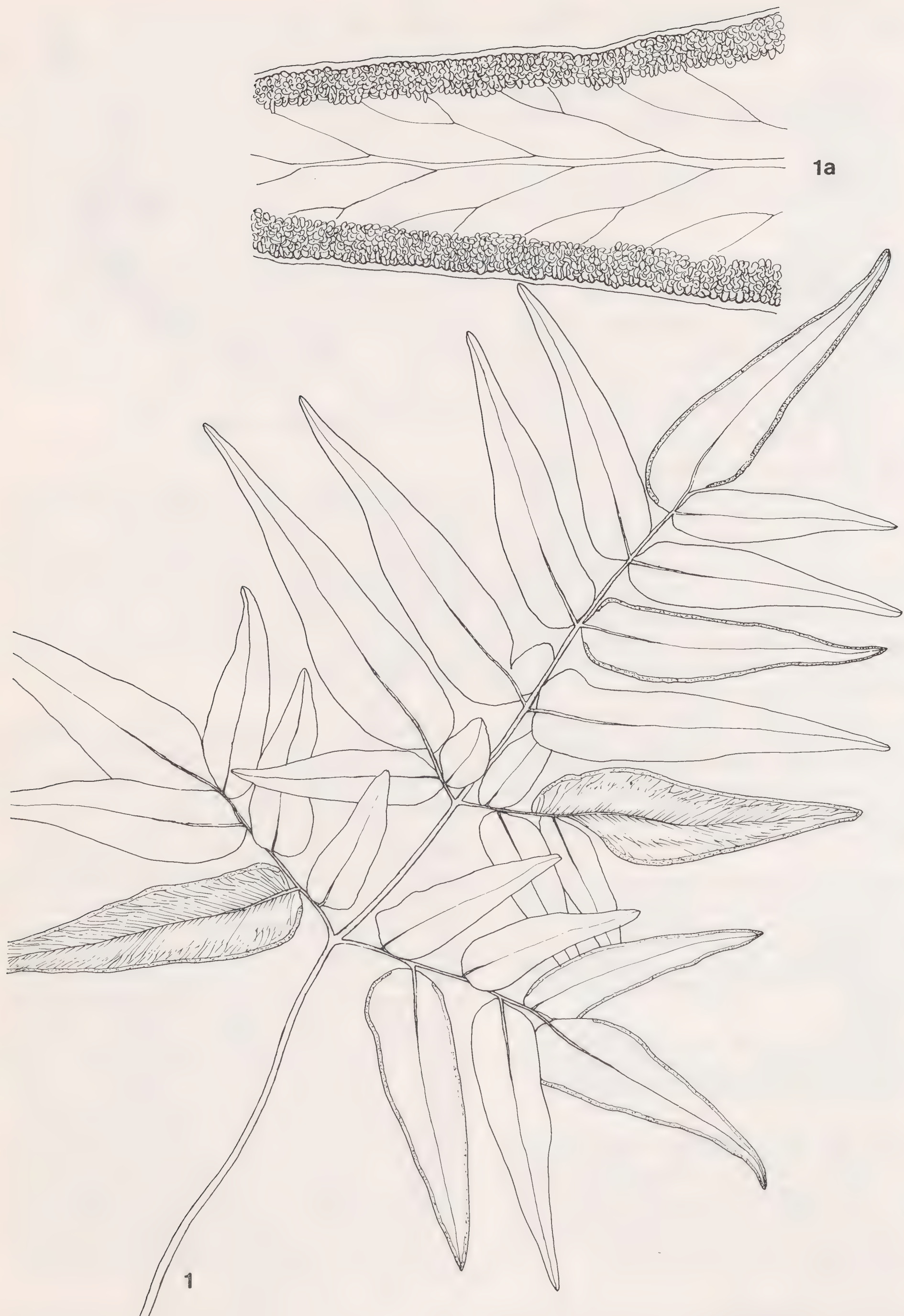


MAP 109.—*Cheilanthes viridis* var. *viridis*

*Cheilanthes hastata* var. *macrophylla* Kunze in Linnaea 10: 532 (1836). *Cheilanthes macrophylla* (Kunze) Kunze in Linnaea 23: 307 (1850). *Allosorus hastatus* var. *macrophylla* (Kunze) Pappe & Raws., Syn. Fil. Afr. Austr. 30 (1858). *Pellaea hastata* var. *macrophylla* (Kunze) Hook., Sp. Fil. 146 (1858); Sim, Ferns S. Afr. edn 1: 102 (1892). *Pellaea viridis* var. *macrophylla* (Kunze) Sim, Ferns S. Afr. edn 2: 208, t. 99 (1915); W. B. G. Jacobsen, Ferns Sthn Afr. 285, t. 205b (1983).

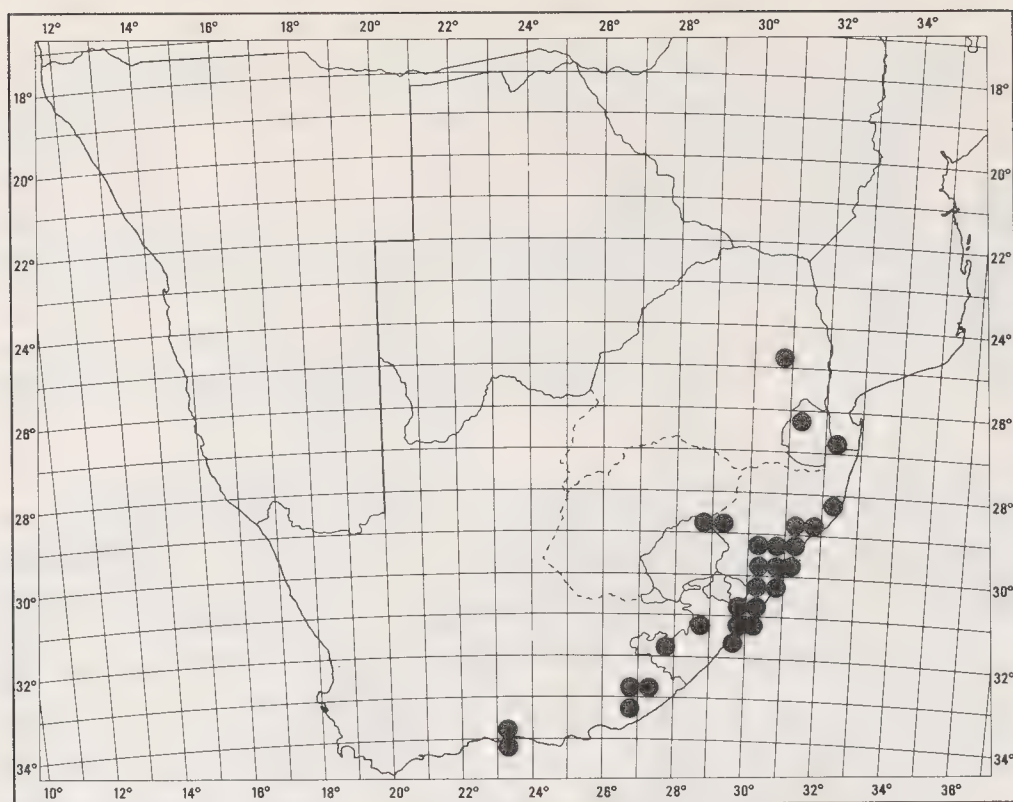
Rhizome creeping, c. 5 mm in diameter, set with lanceolate, attenuate, serrulate, pale brown to ferrugineous, mostly castaneous- to ebeneous-striped rhizome-scales c.  $3 \times 0,75$  mm. Fronds crowded or spaced up to 15 mm apart erect to arching; stipe sulcate, atrocastaneous, about as long as lamina, subglabrous except for scales similar to rhizome-scales basally; lamina herbaceous to very thinly coriaceous, narrowly deltate to pentagonal, c.  $320 \times 200$  mm, pinnate (in young fronds) to 2-pinnate, basal pinnae largest and developed basiscopically; pinnae large (c.  $80 \times 20$  mm), mostly simple, narrowly deltate; ultimate segments subdeltate, acute, simple or lobed basally, glabrous on both surfaces or pubescent below along costae and veins; venation free, apparent; rhachis and secondary rhachises broadly sulcate atrocastaneous, glabrous or pubescent with short hairs, always pubescent in the axils. Sori borne in a marginal soral line; indusium continuous, membranous, subentire, c. 0,5 mm broad. Fig. 41.





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MAP 110.—*Cheilanthes viridis* var. *macrophylla*

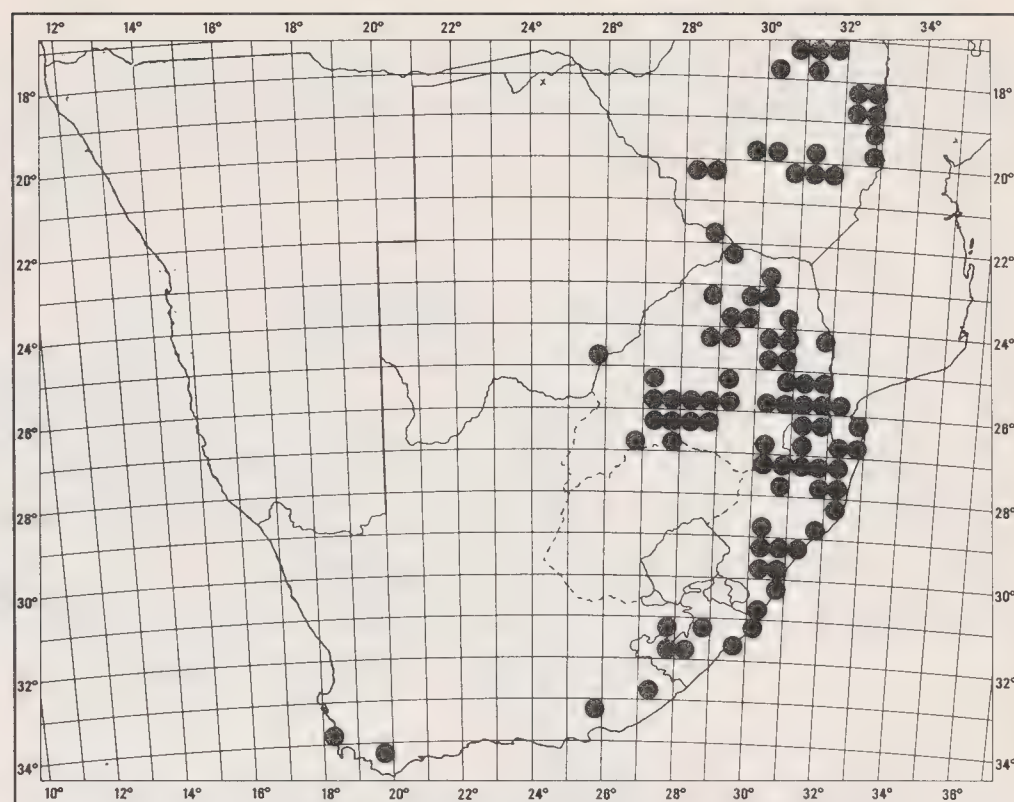
Only known from southern Cape Province, Transkei, Natal, Swaziland and eastern Transvaal. Grows in forest or bush, between 100 and 2 000 m altitude. Map 110.

Vouchers: *Codd & De Winter* 146 (PRE); *Compton* 30082 (PRE); *Hardcastle* 259 (J; NBG; PRE); *Taylor* 2520 (BOL; NBG); *Ward* 2114 (BOL; MO; NH; NU).

19(c). var. **glauc**a (*Sim*) *Schelpe & N. C. Anthony* in *Contr. Bolus Herb.* 10: 155 (1982); *N. C. Anthony* in *Contr. Bolus Herb.* 11: 162, t. 33 (1984). Type: Cape Province, south-west of King William's Town, *Sim* s.n. (PRE, holo.! –BOL, photo.!).

*Pellaea hastata* var. *glauc*a *Sim*, *Kaffrarian Ferns* 30, t. 19 (1891). *Pellaea viridis* var. *glauc*a (*Sim*) *Sim*, *Ferns S. Afr.* edn 2: 209, t. 97, t. 98 fig. 2 (1915); *Schelpe* in *Contr. Bolus Herb.* 1: 82 (1969); in *F.Z. Pterid.*: 135 (1970); in *C.F.A. Pterid.*: 110 (1977); *W. B. G. Jacobsen*, *Ferns Sthn Afr.* 286, t. 205c (1983).

Rhizome creeping, c. 5 mm in diameter, set with linear-lanceolate, attenuate, closely serrulate, light brown to ferruginous, mostly atrocastaneous-striped rhizome-scales c.  $3 \times 0,5$  mm. *Fronds* closely spaced, erect to arching; *stipe* sulcate, atrocastaneous, longer or shorter than lamina, set with scattered scales, more numerous basally; *lamina* thinly coriaceous, narrowly deltate, c.  $200 \times 80$  mm, 2-pinnate to 4-pinnatifid, basal pinnae usually only slightly developed basiscopically; *pinnae* linear-oblong, acute; *ultimate segments* ovate-oblong, obtuse to subacute, glabrous on both surfaces; *venation* free, apparent; *rhachis* and *secondary rhachises* atrocastaneous, deeply

MAP 111.—*Cheilanthes viridis* var. *glauc*a

sulcate, sulca wings castaneous, set with scattered, appressed, filiform scales. *Sori* borne in a marginal soral line; *indusium* continuous, pale membranous, erose, c. 0,3 mm broad. Fig. 42.

South West Africa/Namibia, Botswana, Cape Province, Transkei, Natal, Swaziland and Transvaal, as well as Zimbabwe, Mozambique, Malawi, Zaire, Ruanda, Tanzania, Kenya and Ethiopia. Around rocky outcrops and boulder bases in shrub- and grassland, from near sea level along the Natal coast to c. 2 000 m further inland. Map 111.

Vouchers: *Codd & Dyer* 9106 (PRE); *Esterhuysen* 20762 (BOL); *Giess & Gaff* 10984 (PRE; WIND); *Smith* 2060 (BOL; PRE); *Ward* 2414 (BOL; NU).

20. ***Cheilanthes quadripinnata*** (*Forssk.*) *Kuhn*, *Fil. Afr.* 74 (1868); *N.C. Anthony* in *Contr. Bolus Herb.* 11: 172, t. 35 (1984). Type: Yemen, Hadie, *Forsskal* s.n. (Type lost).

*Pteris quadripinnata* *Forssk.*, *Fl. Aegypt.-Arab.* cxxiv, 186 (1775). *Allosorus quadripinnatus* (*Forssk.*) *Presl*, *Tent. Pterid.* 154 (1836), reimpr. in *Abh. K. Böhm. Ges. Wiss.*, Ser. 4, 5: 154 (1837). *Pteridella quadripinnata* (*Forssk.*) *Mett. ex Kuhn* in *Von Deck.*, *Reisen, Bot.* 3, 3: 16 (1879). *Pellaea quadripinnata* (*Forssk.*) *Prantl* in *Bot. Jb.* 3: 420 (1882); *Sim*, *Ferns S. Afr.* edn 2: 202, t. 192 (1915); *Schelpe* in *Contr. Bolus Herb.* 1: 81 (1969); *F.Z. Pterid.*: 133, t. 41 (1970); *W. B. G. Jacobsen*, *Ferns Sthn Afr.* 288, t. 206 (1983).

*Pteris consobrina* *Kunze* in *Linnaea* 10: 526 (1836). *Pellaea consobrina* (*Kunze*) *Hook.*, *Sp. Fil.* 2: 145, t. 117 A (1858). *Allosorus consobrinus* (*Kunze*) *Pappe & Raws.*, *Syn. Fil. Afr. Austr.* 31 (1858). Type: Cape Province, Witteberg, *Drège* 8827 (LZ, syn. †; B, lecto.! –BOL, photo.!, BM!).

*Cheilanthes triangula* *Kunze* in *Linnaea* 10: 536 (1836). Type: Cape Province, Compasberg, *Drège* b (LZ, syn. †; B, lecto.! –BOL, photo.!, BM!; L –BOL, photo.!).







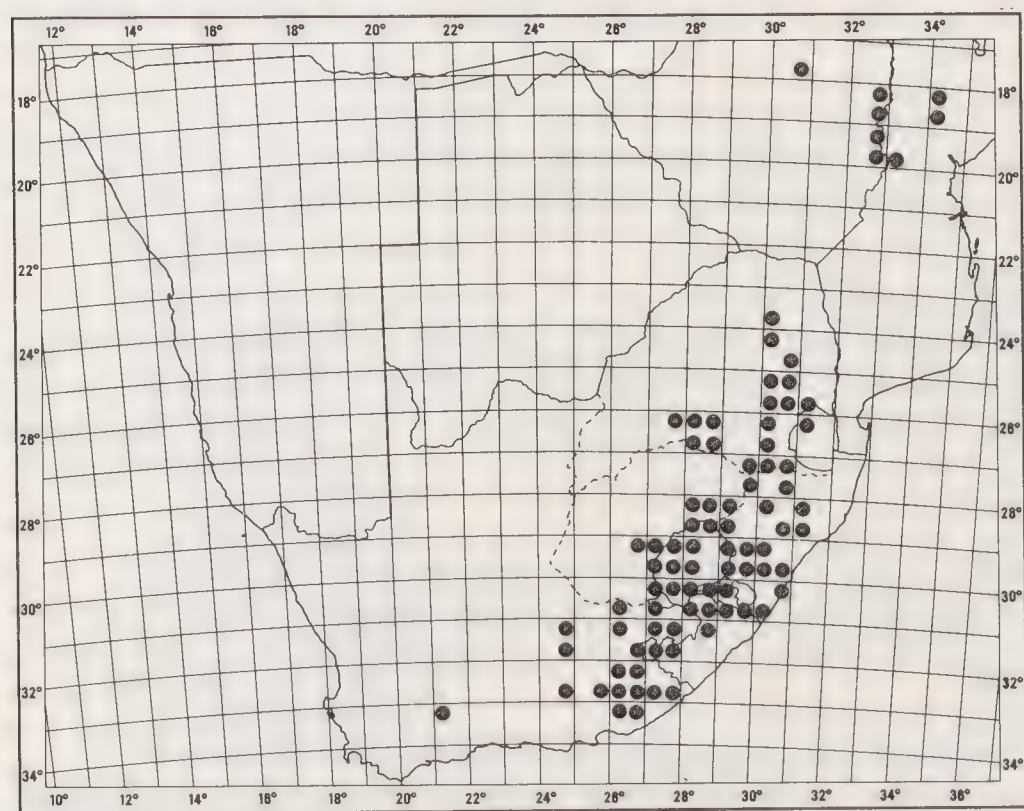
*Cheilanthes atherstonei* Hook., Sp. Fil. 2: 107 (1852). Type: Cape Province, Somerset East, *Atherstone* s.n. (K, holo.).

*Cheilanthes firma* T. Moore in J. Bot., Lond. 5: 225 (1853). Type: Natal, *Plant* s.n. (BM, holo.).

*Cheilanthes linearis* T. Moore in J. Bot., Lond. 5: 226 (1853). Type: Natal, *Plant* s.n. (BM, holo.).

Rhizome shortly creeping, up to 6 mm in diameter, set with narrowly lanceolate, subentire, ferrugineous, concolorous rhizome-scales up to 5 mm long, mostly with a narrow, sclerotic, central stripe. *Fronds* erect to arching, thinly carnose-coriaceous; *stipe* broadly sulcate, castaneous, glabrous or set with occasional narrow scales at first; *lamina* narrowly to broadly hastate-deltate, up to  $580 \times 400$  mm, 3- to 5-pinnate, basal pinnae much-developed basiscopically; *ultimate segments* oblong, subacute, 10–20 mm long, subentire when fertile, margin involute, evidently crenate when sterile, glabrous on both surfaces; *venation* free, obscure except for midvein, or apparent in shaded specimens; *rhachis* and *secondary rhachises* sulcate castaneous, glabrous. *Sori* forming a marginal soral line, with conspicuous red-tipped paraphyses; *indusium* continuous, subentire, membranous, c. 0,2 mm broad. Fig. 43.

Cape Province, Transkei, Lesotho, Orange Free State, Natal, Swaziland, Transvaal, Zimbabwe, Mozambique, Malawi, Tanzania, Kenya, Uganda, Ethiopia, Sudan, Cameroun, Madagascar and Comoro Islands. Along forest margins or around boulder bases in grassland or scrub, c. 600–3 300 m. Map 112.



MAP 112.—*Cheilanthes quadripinnata*

Vouchers: *Cooper* 1423 (BM; NH; PRE); *Dieterlen* 68 (BOL; PRE; STE); *Esterhuysen* 26791 (BM; BOL; GH; MO; P); *Fisher* 837 (NH; NU; PRE); *Killick* 852 (GRA; PRE).

21. *Cheilanthes multifida* (Swartz) Swartz, Syn. Fil. 129, 334 (1806); Sim, Ferns S. Afr. edn 2: 231, t. 113 (1915); Schelpe in Contr. Bolus Herb. 1: 70 (1969); in F.Z. Pterid.: 123 (1970); in C.F.A. Pterid.: 100 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 264, t. 189 (1983). Type: Cape of Good Hope, *Thunberg* s.n., Herb. Montin (S, lecto.).

Rhizome short, creeping, c. 4 mm in diameter, set with subulate-attenuate, subentire, stramineous to somewhat ferrugineous, concolorous rhizome-scales c.  $3,5 \times 0,4$  mm and others with a central ebeneous stripe. *Fronds* tufted, erect to arching, thinly carnose-coriaceous; *stipe* broadly sulcate, castaneous, subglabrous except for lanceolate, pale concolorous and striped scales similar to rhizome-scales basally; *lamina* oblong-ovate to somewhat deltate, always longer than broad, up to  $320 \times 280$  mm, 4- to 5-pinnatifid, basal pinnae not reduced, basiscopically developed; *pinnae* unequally ovate-deltate, acute; *pinnules* ovate-lanceolate to deltate, very deeply pinnatifid into ovate-oblong, obtuse, crenate or pinnatifid lobes, glabrous on both surfaces; *venation* obscure; *rhachis* and *secondary rhachises* sulcate, castaneous to atrocastaneous, very narrowly winged. *Sori* discrete, borne around margins of ultimate segments; *indusium* pale, entire to lacerate, c. 0,2–0,8 mm wide. Fig. 44: 1.

Indusium semicircular, entire to erose. (a). subsp. *multifida*  
Indusium deeply lacerate.....(b). subsp. *lacerata*

#### 21(a). subsp. *multifida*.

N. C. Anthony in Contr. Bolus Herb. 11: 183, t. 37 (1984).

*Adiantum multifidum* Swartz in J. Bot., Gött. 1800, 2: 85 (1801).

*Adiantum globatum* Poir. in Lam., Encycl., Suppl. 1: 144 (1810). Type: Cape Province, Cape Peninsula, Table Mountain, Herb. Jussieu no. 1433 (P, holo.).

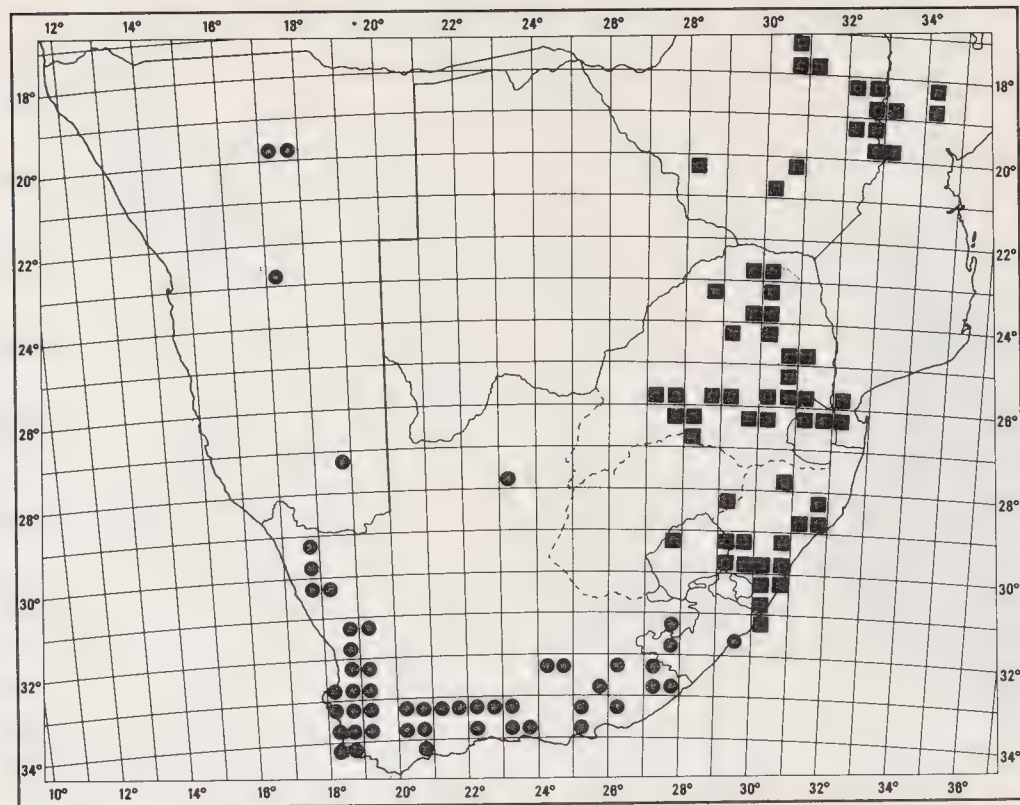
*Cheilanthes refracta* Pappe & Raws., Syn. Fil. Afr. Austr. 34 (1858). Type: Cape Province, "Griqualand" (near Kuruman) (?BM, holo.).





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MAP 113.—● *Cheilanthes multifida* subsp. *multifida*  
■ *Cheilanthes multifida* subsp. *lacerata*

*Cheilanthes bolusii* Bak. in Hook., Ic. Pl. t. 1636 (1886); Sim, Ferns S. Afr. edn 2: 234, t. 106 fig. 2 (1915). Type: Cape Province, Darling Bridge, Breede River, *Bolus* 2801 (K, holo.!, BOL!).

Angola, South West Africa/Namibia, Cape Province, Transkei and Lesotho. On rocky slopes around boulder bases and in rock crevices, from 180 m in south-western Cape Province to 2 000 m in South West Africa/Namibia and Lesotho. Map 113.

Vouchers: *Bowmaker* 53 (BOL); *Esterhuysen* 17998 (BOL; MO; NBG; PRE); *Giess* 11652 (WIND); 11798 (WIND); *Schelppe* 5892 (BM; BOL; GH; NBG; PR); *Steyn* 399 (BOL; NBG).

21(b). subsp. *lacerata* N. C. Anthony & *Schelppe* in Contr. Bolus Herb. 10: 153 (1982); N. C. Anthony in Contr. Bolus Herb. 11: 190, t. 39 (1984). Type: Transvaal, Mariepskop, *Schweickerdt* 2428 (BOL, holo.!).

*Cheilanthes multifida* var. *flexa* Kunze in Linnaea 10: 537 (1836). Type: Transkei, near Umsikaba, *Drège* s.n. (LZ, holo. †; B, lecto. !—BOL, photo. !; L—BOL, photo. !).

Transkei, Natal, Lesotho, Swaziland, Transvaal, Zimbabwe, Mozambique, Malawi, Zambia, Tanzania and Kenya. On rocky slopes around boulder bases and in rock crevices, from 400 m in Natal to 2 500 m in Transvaal and Zimbabwe. Map 113.

Vouchers: *Codd & Dyer* 9043 (BOL; PRE); 9109 (BOL; PRE); *Compton* 26681 (NBG; PRE); *Johnstone* 127, 154 (NU); *Schelppe* 5079 (BOL); *Ward* 3442 (NPB; NU).

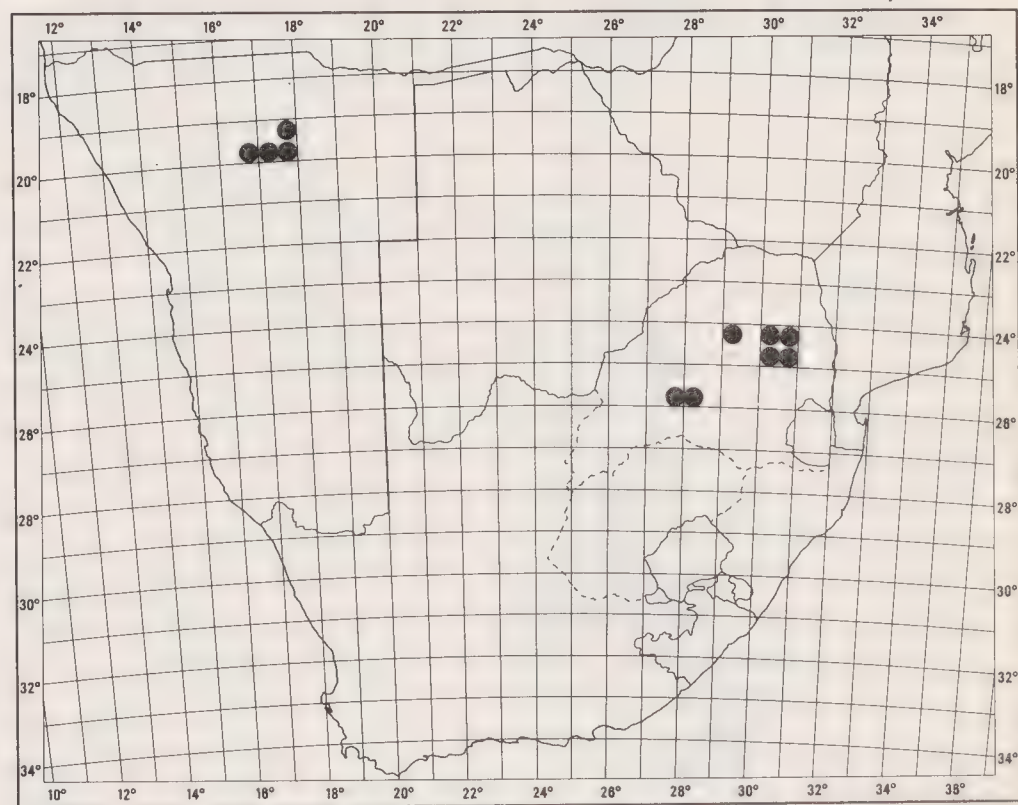
Proceeding northwards from Zimbabwe the indusium becomes less noticeably lacerate until in Kenya it assumes a triangular shape.

22. *Cheilanthes pentagona* *Schelppe* & N. C. Anthony in Contr. Bolus Herb. 10: 152 (1982); N. C. Anthony in Contr. Bolus Herb. 11: 197, t. 40 (1984). Type: South West Africa/Namibia, Grootfontein, 8 km east from Otavi, *Schelppe* 4820 (BOL, holo. !; GH !; K !; MO !; PRE !).

Rhizome creeping, c. 2,5 mm in diameter, set with lanceolate, entire, appressed, ferruginous rhizome-scales c. 3 mm long with a central sclerotic stripe. *Fronde* thinly carnoscoriaceous, erect to arching; stipe broadly sulcate, atrocastaneous, longer than lamina, glabrous except for scales similar to rhizome-scales near base; *lamina* hastate-pentagonal, often broader than long, 5-pinnatifid, basal pinnae largest and conspicuously developed basiscopically; *middle pinnae* oblong-ovate, broader basiscopically; *ultimate segments* unequally deltate, obtuse, crenate, glabrous on both surfaces; *venation* apparent on both surfaces; *rhachis* and *secondary rhachises* sulcate, atrocastaneous, narrowly winged by lamina, glabrous. *Sori* discrete, borne around margins of ultimate segments; *indusium* discontinuous, pale, membranous, semicircular to oblong-deltate, subentire to erose, c. 0,5 mm broad. Fig. 44: 2.

South West Africa/Namibia, Transvaal and Zimbabwe. In rock crevices of dolomite, c. 1 650 m. Map 114.

Vouchers: *Mogg* 34830 (J); *Schlechter* 4687 (BOL; GRA; PRE); *Schweickerdt* 2106 (NU; PRE; WIND); *Strey* 3813 (PRE); *Van Jaarsveld* 2034 (NBG).



MAP 114.—*Cheilanthes pentagona*

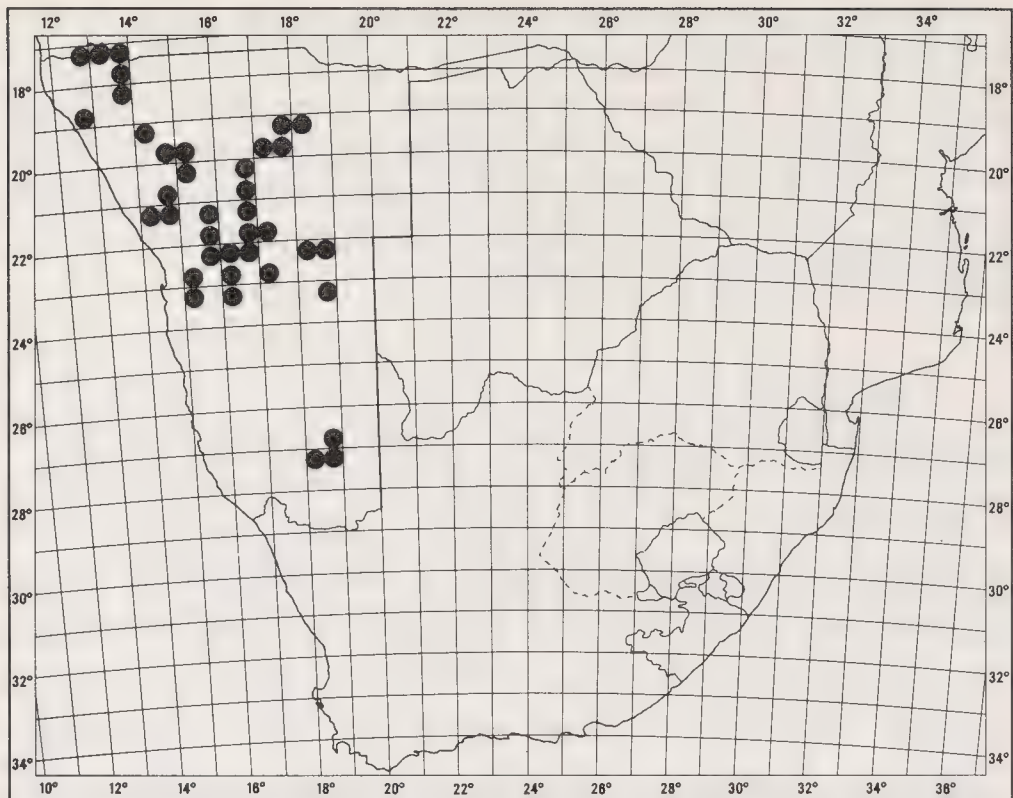
FIG. 43.—1, *Cheilanthes quadripinnata*, frond,  $\times 0,6$  (*MacOwan* sub *Bolus* 172); 1a, portion of rhizome with stipe bases,  $\times 0,6$  (*Schelppe* 5926); 1b, detail of lower surface of ultimate segments,  $\times 3,6$  (*Schelppe* 5926).





FIG. 44.—1, *Cheilanthes multifida* subsp. *multifida*, part of plant,  $\times 0,6$ ; 1a, detail of lower surface of ultimate segments,  $\times 4,8$  (Moffett 206). 2, *C. pentagona*, frond,  $\times 0,6$ ; 2a, detail of lower surface of ultimate segments,  $\times 4,8$  (Giess 12555). 3, *C. dinteri*, frond,  $\times 0,6$ ; 3a, detail of lower surface of ultimate segments,  $\times 4,8$  (Merxmüller 10742).



MAP 115.—*Cheilanthes dinteri*

23. *Cheilanthes dinteri* Brause in Bot. Jb. 53: 385 (1915); Launert in F.S.W.A. 7: 2 (1969); Schelpe in Contr. Bolus Herb. 1: 71 (1969); in C.F.A. Pterid.: 102 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 266, t. 190 (1983); N. C. Anthony in Contr. Bolus Herb. 11: 203, t. 42 (1984). Type: South West Africa/Namibia, Okahandja, *Dinter* 392 (B, lecto.!-BM, photo.!; BM!; BR!; GRA!; PRE!; S; SAM!-BOL, photo.!).

Rhizome short, erect, up to 4 mm in diameter, set with entire, concolorous, dark ferruginous rhizome-scales c.  $3 \times 0,1$  mm. *Fronde*s erect, herbaceous to carnose-coriaceous; *stipe* sulcate, castaneous, set with scattered narrow, attenuate, ferruginous scales; *lamina* narrowly ovate-deltate, acute, c.  $140 \times 50$  mm, 2-pinnate to 3-pinnatifid (2-pinnatifid in young plants), basal pinnae usually largest, not conspicuously developed basiscopically; *pinnae* narrowly deltate; *pinnules* narrowly deltate to hastate, pinnatifid into oblong to deltate, shallowly crenate, rounded lobes, glabrous on both surfaces; *venation* obscure; *rhachis* and *secondary rhachises* sulcate, castaneous, glabrous. *Sori* borne at margins of ultimate segments; *indusia* pale, entire to crenate, 0,1 mm broad or narrower. Fig. 44: 3.

Endemic to South West Africa/Namibia and southern Angola. Around boulder bases and in crevices of outcrops of sandstone, schist and granite, usually with a south aspect, at altitudes between 1 200 and 1 800 m. Map 115.

Vouchers: *Merxmüller & Giess* 30351 (PRE; WIND); *Pearson* 8114 (BOL; STE); *Roux* 244 (NBG); *Schelpe* 4776 (B; BM; BOL; GH; K; M; MO; P; PRE; S; US).

24. *Cheilanthes bergiana* Schlechtd., Adumbr. 51 (1832); Schelpe in Contr. Bolus Herb. 1: 71 (1969); in F.Z. Pterid.: 124 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 267, t. 191 (1983); N. C. Anthony in Contr. Bolus Herb. 11: 209, t. 43 (1984). Type: Cape of Good Hope, *Bergius* s.n. (?LE, holo.).

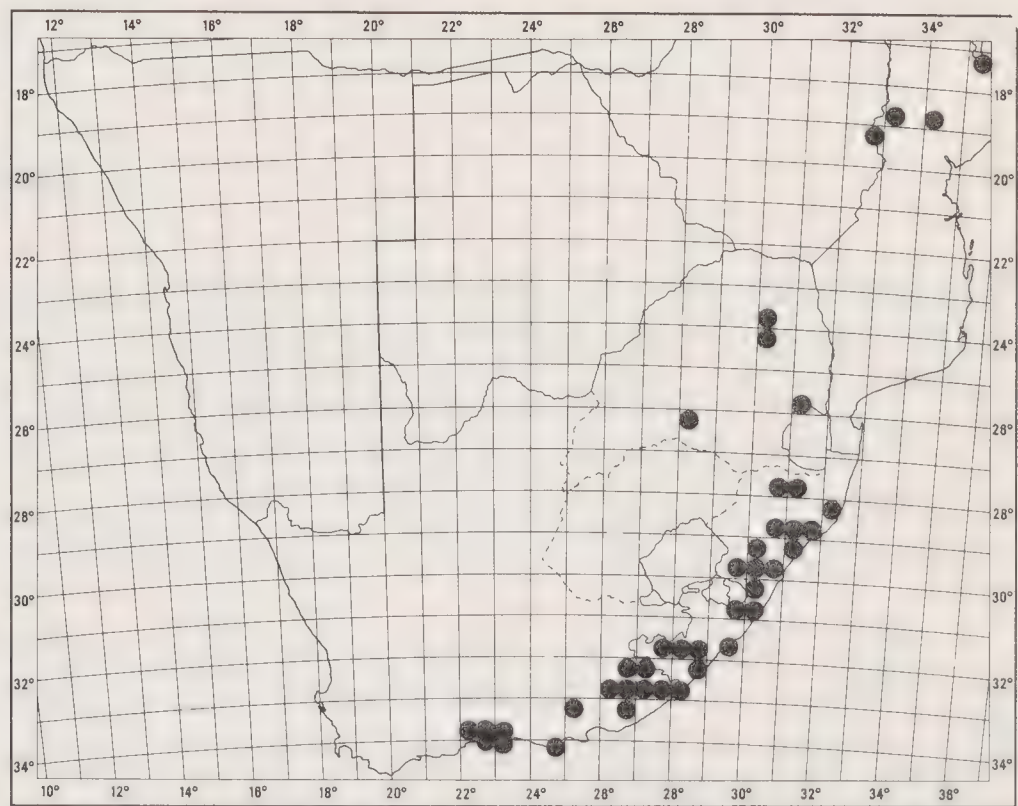
*Hypolepis bergiana* (Schlechtd.) Hook., Sp. Fil. 2: 67 (1852); Sim, Ferns S. Afr. edn 2: 238, t. 115 (1915).

*Cheilanthes elata* Kunze in Linnaea 10: 542 (1836). Type: Cape Province, Koratra (Karatara), *Drège* s.n. (LZ, holo.†; BM, lecto.!; B!-BOL, photo.!).

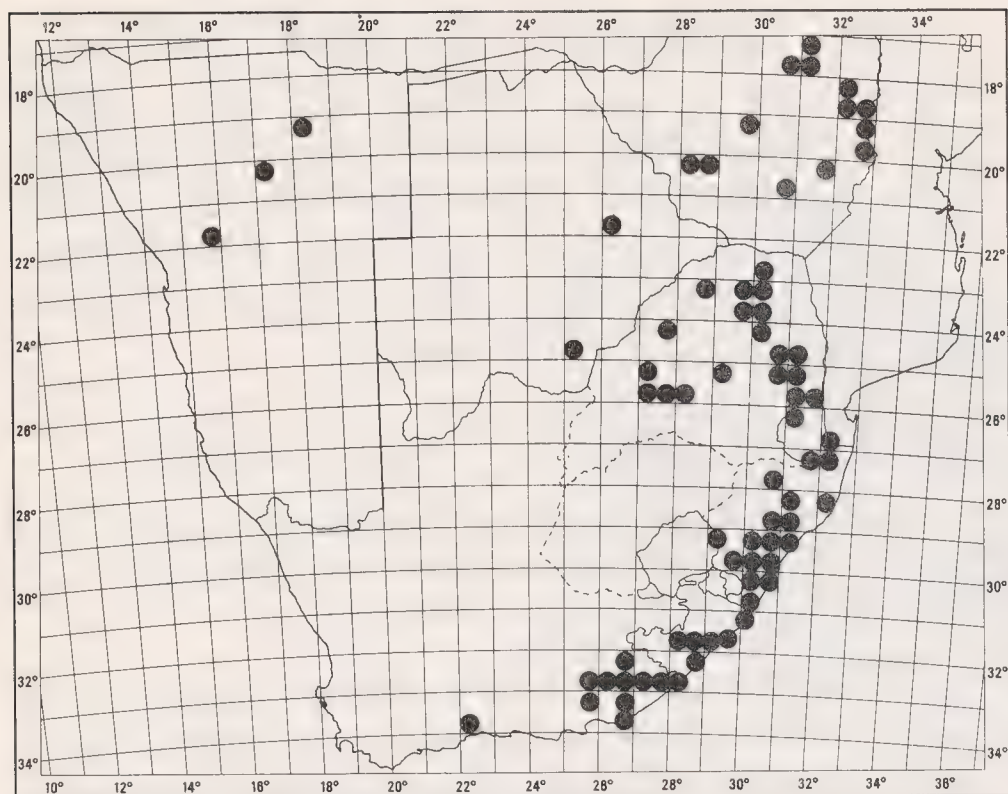
Rhizome short, erect, up to 10 mm in diameter, set with atrocastaneous, subulate-attenuate, subentire rhizome-scales up to 9 mm long with pale brown margins. *Fronde*s arching, herbaceous; *stipe* sulcate, atrocastaneous, densely pilose with matted multicellular brown hairs up to 1 mm long; *lamina* pentagonal, up to  $0,3 \times 0,28$  m, 3-pinnate to 5-pinnatifid, lowest pinnae almost as long as lamina and much-developed basiscopically; *upper pinnae* oblong, acute; *ultimate segments* oblong, obtuse, up to  $150 \times 70$  mm, pinnatifid into decurrent-oblong, rounded lobes, set with broad, flattened, multicellular hairs along costae and veins on both surfaces; *rhachis* pilose with matted multicellular hairs. *Sori* borne on lateral margins of lobes of ultimate segments, less than 1 mm in diameter; *indusia* subentire, membranous.

Cape Province, Transkei, Natal, Swaziland, Transvaal, Zimbabwe, Mozambique, Malawi, Zaire, Tanzania and Madagascar. Confined to deeply shaded habitats among forest undergrowth, 250–1 800 m. Map 116.

Vouchers: *Fisher* 800 (NH; NU; PRE); 1009 (BFLU; NU; PRE); *Flanagan* 1248 (BOL; PRE; SAM); *Schlechter* 2375 (BM; GRA; J; K; PRE); *Whellan* 1507 (BM; BOL; GH; SRGH).

MAP 116.—*Cheilanthes bergiana*



MAP 117.—*Cheilanthes concolor*

25. *Cheilanthes concolor* (Langsd. & Fisch.) R. & A. Tryon in *Rhodora* 83: 133 (1981); N. C. Anthony in *Contr. Bolus Herb.* 11: 217, t. 45 (1984). Type: Marquesas Archipelago, Nucahiva, *Langsdorff* s.n. (LE, holo.; BM!).

*Pteris concolor* Langsd. & Fisch., *Ic. Fil.* 19, t. 21 (1810). *Pellaea concolor* (Langsd. & Fisch.) Bak. in *Mart., Fl. Bras.* 1: 396 (1870). *Allosorus concolor* (Langsd. & Fisch.) Kuntze, *Rev. Gen.* 2: 806 (1891). *Doryopteris concolor* (Langsd. & Fisch.) Kuhn in *Von Deck., Reisen, Bot.* 3, 3: 19 (1879); Sim, *Ferns S. Afr. edn 2*: 214, t. 104 (1915).

*Cheilanthes kirkii* Hook., *Second Cent.* t. 81 (1861). *Doryopteris concolor* var. *kirkii* (Hook.) R.E. Fr. in *Wiss. Ergebn. Schwed. Rhod.-Kongo-Exped.* 1: 4 (1914); Launert in *F.S.W.A.* 7: 3 (1969); Schelpe in *Contr. Bolus Herb.* 1: 75 (1969); in *F.Z. Pterid.*: 121, t. 37C (1970); in *C.F.A. Pterid.*: 96, t. 17B (1977); W. B. G. Jacobsen, *Ferns Sthn Afr.* 245, 176a–b (1983). *Doryopteris kirkii* (Hook.) Alston in *Bolm Soc. broteriana, sér. 2*, 30: 14 (1956). Type: Mozambique, Zambesi River, *Kirk* s.n. (K, holo.!—G, photo.).

*Doryopteris nicklesii* Tardieu-Blot in *Notul. Syst.* 3: 166 (1948). *Doryopteris concolor* var. *nicklesii* (Tardieu-Blot) Schelpe in *Bolm Soc. broteriana, sér. 2*, 41: 212 (1967); in *Contr. Bolus Herb.* 1: 76 (1969); in *F.Z. Pterid.*: 121 (1970); W. B. G. Jacobsen, *Ferns Sthn Afr.* 264, t. 176c (1983). Type: Central African Republic, Ubangui Shari, Banqui, *Nickles* 95 (P, holo.).

Rhizome short, procumbent, c. 3 mm in diameter, set with linear-lanceolate to subulate, membranous, entire, pale brown rhizome-scales c. 3 mm long with a central castaneous stripe. *Fronde*s tufted, suberect, thinly caria-ceous; *stipe* sulcate, atrocastaneous, set with scales similar to but smaller than rhizome-scales; *lamina* broadly hastate-pentagonal, almost as broad as long, basal pinnae largest and conspicuously developed basiscopically, 3-pinnatifid; upper *pinnae* oblong-acuminate, decurrent at the base, pinnatifid into oblong, acute to acuminate lobes, glabrous on both surfaces; *venation* obscure; *rhachis* and under surface of costae and larger costules atrocastaneous to ebeneous, glabrous, *Sori* marginal, discrete or continuous; *indusia* membranous, discontinuous or continuous, c. 0,5 mm broad. Fig. 39: 3.

South West Africa/Namibia, Botswana, Cape Province, Transkei, Natal, Swaziland and Transvaal; widespread in tropical Africa, Asia, Malaysia, northern Australia, Pacific Islands and Central and South America (Tryon, 1942). Map 117.

Vouchers: *Codd & Dyer* 9121 (BOL; PRE); *Giess & Gaff* 10969 (PRE; WIND); *Rogers* 17517 (GRA); *Roux* 552 (BOL; NBG); *Strey* 7158 (BOL; NH; NU; PRE).

Intergradation in soral characters does not allow the distinction of varieties as previously maintained in this taxon. Instead it can be regarded as a highly variable pantropical species.

## 8. PELLAEA

*Pellaea* Link, *Fil. Sp.* 59 (1841); Engl., *Pflanzenw. Afr.* 2: 38 (1908); Tardieu-Blot in *Mém. Inst. fr. Afr. noire* 28: 91 (1953); in *Fl. Madag.* 5, 1: 153 (1958); Alston in *F.W.T.A. edn 2, Suppl.* 43 (1959); Tardieu-Blot in *Fl. Gabon* 8: 103 (1964); in *Fl. Camer.* 3: 140 (1964); Launert in *F.S.W.A.* 7: 5 (1969); Schelpe in *F.Z. Pterid.*: 128 (1970); in *Expl. Hydrobiol. Bassin L. Bangw. & Luapula* 8, 3 *Pterid.*: 61 (1973); in *C.F.A. Pterid.*: 104 (1977), nom. conserv. Type species: *P. atropurpurea* (L.) Link (= *Pteris atropurpurea* L.).

Rhizome usually shortly creeping, solenostelic, set with lanceolate, castaneous to black, concolorous or dark-striped rhizome-scales. *Fronde*s coriaceous, glabrous, pilose or set with scales; *stipes* terete or sulcate; *lamina* pinnate to 4-pinnate with articulated segments; *veins* free or anastomosing. *Sori* submarginal, confluent into a soral line (rarely discrete), usually covered by a continuous indusium formed from the reflexed margin; paraphyses usually absent.



A genus of about 30 species, most of which occur in Southern Africa and South America.

- 1a Ultimate segments oblong or lanceolate:
  - 2a Lamina simply pinnate ..... 5. *P. pectiniformis*
  - 2b Lamina 2- to 3-pinnate:
    - 3a Venation free; lamina generally 3-pinnate, the ultimate segments c.  $10 \times 3$  mm ..... 4. *P. boivinii*
    - 3b Venation anastomosing\*; lamina generally 2-pinnate, the ultimate segments c.  $40 \times 9$  mm ..... 3. *P. dura*
- 1b Ultimate segments rotund, ovate or deltate:
  - 4a Rhizome-scales concolorous, reddish brown ..... 2. *P. rufa*
  - 4b Rhizome-scales light brown with a dark central sclerotic stripe:
    - 5a Stipe and rhachis terete ..... 6. *P. calomelanos*
    - 5b Stipe and rhachis sulcate:
      - 6a Pinnules ovate; indusia oblong, discontinuous, membranous, erose ..... 1. *P. pteroides*
      - 6b Pinnules rotund to broadly hastate with 3–5 acute to obtuse points; indusium linear, continuous, carnose-coriaceous, entire ..... 7. *P. leucomelas*

\* Visible after clearing in aqueous chlorine solution or strong aqueous boiling potassium hydroxide solution.

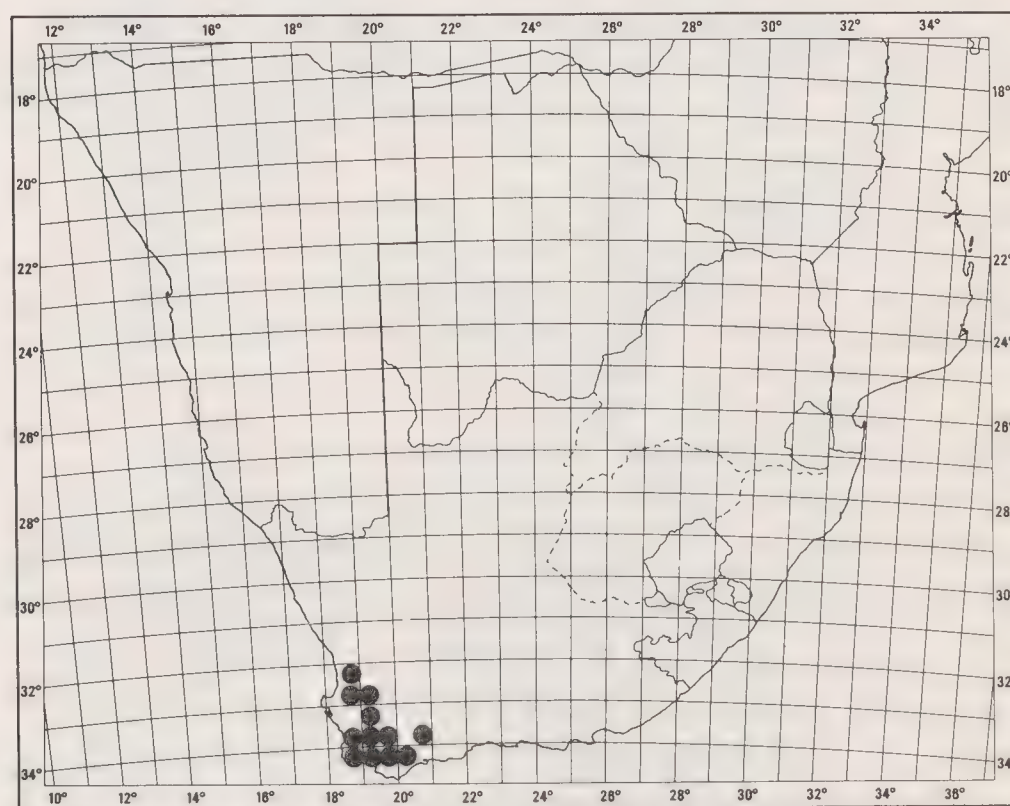
1. ***Pellaea pteroides* (L.) Prantl** in Bot. Jb. 3: 420 (1882); Sim, Ferns S. Afr. edn 2: 213, t. 103 (1915); W. B. G. Jacobsen, Ferns Sthn Afr. 275, t. 198 (1983); N. C. Anthony in Contr. Bolus Herb. 11: 226, t. 46 (1984). Type: Cape of Good Hope (LINN 1252/14, holo.!).

*Adiantum pteroides* L., Mant. 130 (1767). *Cheilanthes pteroides* (L.) Swartz, Syn. Fil. 128 (1806). *Cassebeera pteroides* (L.) Presl, Tent. Pterid. 155, t. 6 fig. 7 (1836). *Adiantopsis pteroides* (L.) T. Moore, Ind. Fil. 37 (1857). *Choristosoria pteroides* (L.) Mett. ex Kuhn in Von Deck, Reisen, Bot. 3, 3: 13 (1879).

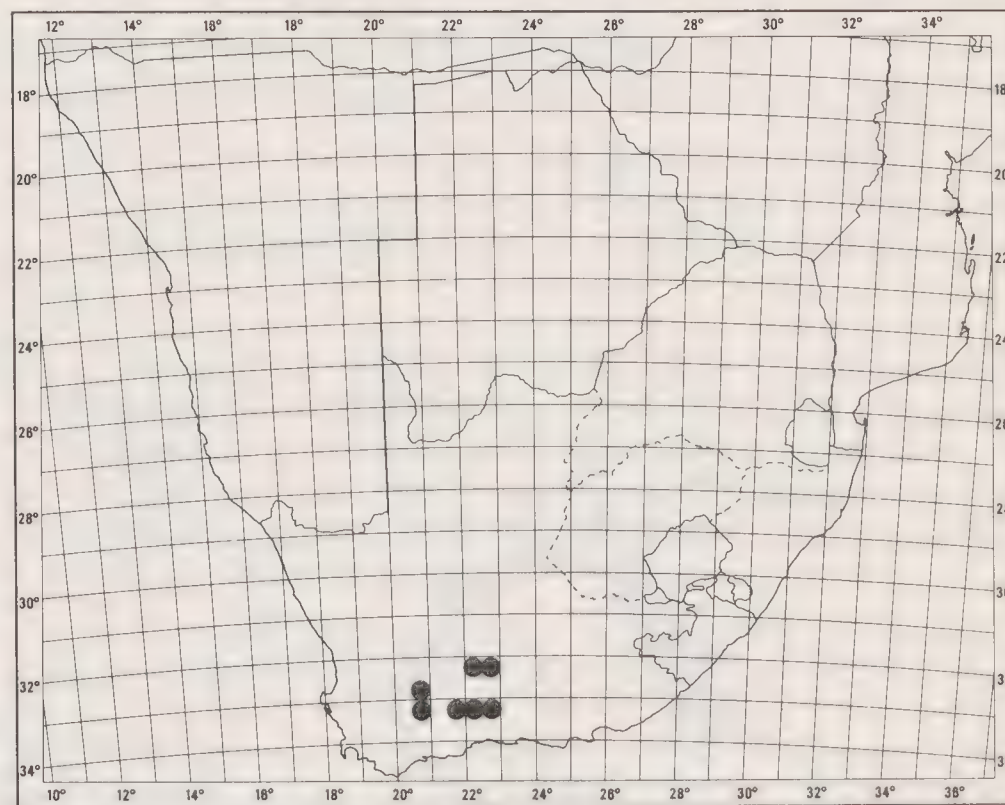
*Pteris orbiculata* Houtt., Nat. Hist. 14: 108, t. 96 fig. 3 (1783). Iconotype: Houttyn, Nat. Hist. 14: 108, t. 96 fig. 3 (1783)!, from the Cape.

Rhizome up to 7 mm in diameter, set with light brown, lanceolate, attenuate, serrulate rhizome-scales c. 5 mm long with a broad central atrocastaneous stripe. *Fronds* erect, coriaceous, spaced up to 10 mm apart; *stipe* shallowly sulcate, castaneous, set with pale brown concolorous scales, becoming subglabrous with age; *lamina* ovate-deltate, up to  $300 \times 260$  mm, 2-to 3-pinnate, basal pinnae largest and developed basiscopically; *ultimate segments* narrowly oblong to narrowly ovate or oblong-elliptic, acute to obtuse, minutely crenate, glabrous, up to  $30 \times 15$  mm, articulated to short ebeneous petioles; *venation* obscure except for midrib; *rhachis* shallowly sulcate, castaneous. *Sori* marginal, discrete; *indusium* broadly oblong, obtuse, membranous, up to 0,6 mm long and broad.

Endemic to south-western Cape Province. On broad ledges of sandstone or amongst rocks (rarely in the shade of tall riverine scrub) usually on south aspect slopes, between 300 and 1 730 m altitude. Map 118.



MAP 118.—*Pellaea pteroides*



MAP 119.—*Pellaea rufa*







Vouchers: *Esterhuysen* 25650 (BM; BOL); *Rodin* 3145 (BOL; PRE); *Schelte* 1147 (BM; NU); *Wolley-Dod* 546 (BOL; PRE).

*P. pteroides* is unusual amongst the cheilanthoid ferns in having a cheilanthoid sorus together with the habit exhibited by a number of species of *Pellaea*. It has been assigned to various genera by different authors and is the type species of the genus *Choristosoria* Mett. ex Kuhn.

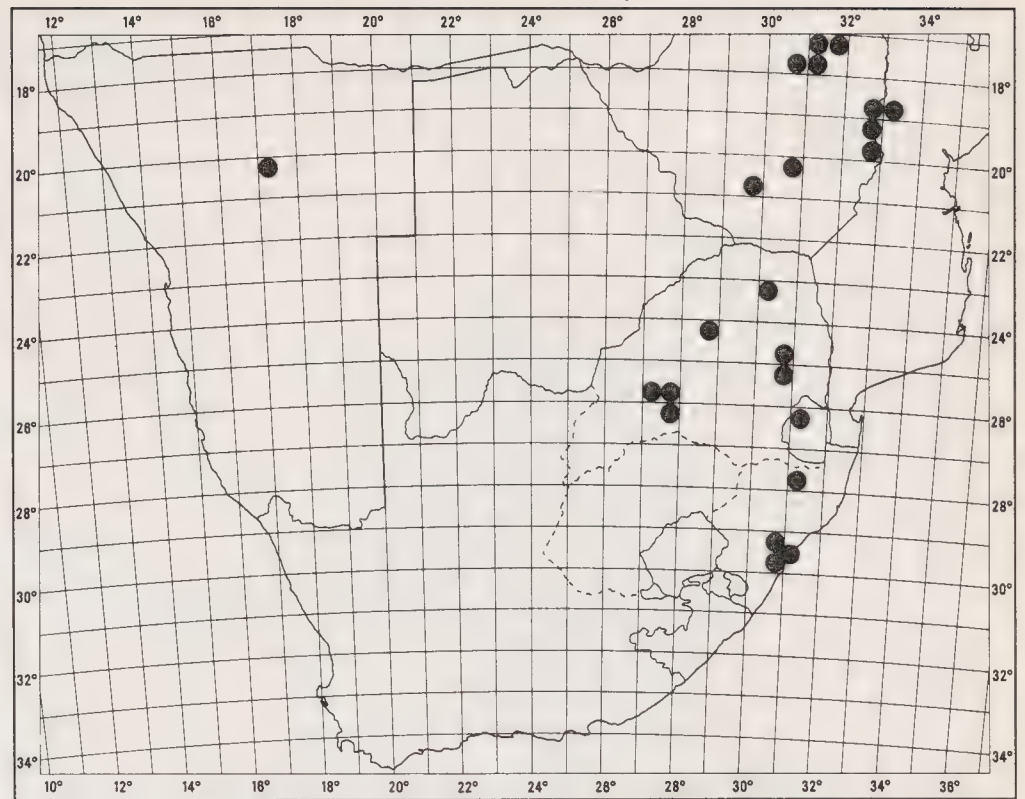
2. ***Pellaea rufa*** A. Tryon in Ann. Mo. bot. Gdn 42: 101, t. 7 (1955); W. B. G. Jacobsen, Ferns Sthn Afr. 276, t. 199 (1983); N. C. Anthony in Contr. Bolus Herb. 11: 232, t. 48 (1984). Type: Cape Province, Laingsburg, Ngaap Kop, *Compton* 16402 (US, holo.!, NBG!).

Rhizome widely creeping, c. 2,5 mm in diameter, set with pale ferrugineous, lanceolate, attenuate, concolorous, entire to minutely serrulate rhizome-scales up to 4 mm long. *Fronds* erect, coriaceous, spaced up to 10 mm apart; *stipe* subterete, castaneous, becoming atrocastaneous with age, shorter than lamina, glabrous except for both broad and hair-like pale ferrugineous scales basally; *lamina* narrowly oblong-elliptic, up to 240 × 60 mm, 2-pinnate or occasionally 3-pinnate, basal pinnae often reduced; *pinnules* broadly elliptic to rotund, entire, up to 9 × 7 mm, usually purplish above, green below, glabrous, articulated to short petiolules; *venation* obscure; *rhachis* subterete, castaneous and set with scattered multicellular hairs at first, becoming atrocastaneous and glabrous with age. *Sori* linear; *indusium* subentire, up to 0,6 mm broad. Fig. 45:1.

Endemic to southern Cape Province. In rock crevices or shale bank clefts, usually on south aspect slopes, 900–1 150 m. Map 119.

Vouchers: *Drège* s.n. (BM; K; MO; P; S); *Marloth* 2117 (BOL; STE); *Rodin* 3342 (BOL; K; MO; PRE; UC); *Schelte* 4922 (B; BOL; C; GH; K; M; MO; P; PR; PRE; S).

3. ***Pellaea dura*** (Willd.) Hook., Sp. Fil. 2: 139, t. 113 A (1858); Sim, Ferns S. Afr. edn 2: 198, t. 90 (1915); *Schelte* in Contr. Bolus Herb. 1: 78 (1969); in F.Z. Pterid.: 132 (1970); in C.F.A. Pterid.: 108 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 273, t. 196 (1983); N. C. Anthony in Contr. Bolus Herb. 11: 237, t. 49 (1984). Type: Réunion, *Bory* s.n., Herb. Willdenow no. 19982 (B, holo.!).



MAP 120.—*Pellaea dura*

*Pteris dura* Willd. in L., Sp. Pl. edn 4, 5: 376 (1819). *Allosorus durus* (Willd.) Presl, Tent. Pterid. 153 (1836). *Litobrochia dura* (Willd.) T. Moore, Ind. Fil. 44 (1857). *Pteridella dura* (Willd.) Kuhn in Von Deck., Reisen, Bot. 3, 3: 14 (1879).

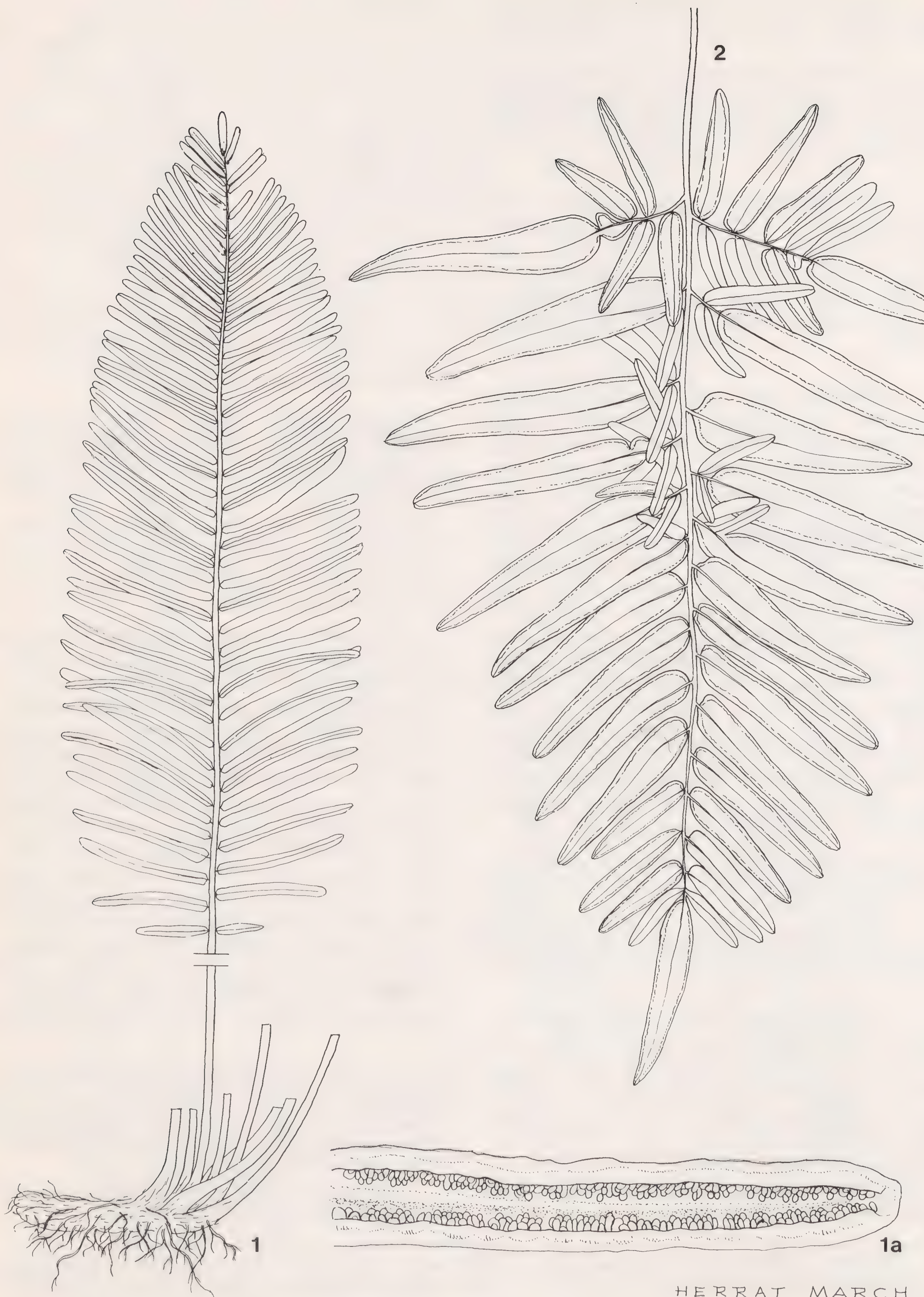
*Pteris burkeana* Hook., Sp. Fil. 2: 213, t. 126B (1858). *Pellaea burkeana* (Hook.) Bak. in Hook. & Bak., Syn. Fil. 153 (1867). *Pellaeopsis burkeana* (Hook.) J. Sm., Hist. Fil. 290 (1875). Type: Transvaal, Magaliesberg, *Burke* s.n. (K, holo.!,—BOL, microfiche!).

Rhizome c. 6 mm in diameter, set with lanceolate-attenuate, nitid, ferrugineous, serrulate, concolorous and striped rhizome-scales c. 5 mm long. *Fronds* erect, coriaceous; *stipe* terete, ebeneous, subglabrous, with a few light brown scales towards base, usually as long as or longer than lamina; *lamina* lanceolate to ovate, up to 250 × 110 mm, 2-pinnate (simply pinnate in small fronds); *upper pinnae and pinnules* of lower pinnae very narrowly to broadly linear, entire, obtuse, up to 60 × 11 mm, with cordate bases articulated to petioles and petiolules; *veins* anastomosing, obscure; *rhachis and secondary rhachises* terete, ebeneous, minutely pubescent ventrally, glabrous dorsally. *Sori* forming a marginal line; *indusium* continuous, entire, membranous, c. 0,3 mm broad. Fig. 46: 2.

South West Africa/Namibia, Natal, Transvaal, Zimbabwe, Angola, Mozambique, Zambia, Malawi, Tanzania, Madagascar, Comoro Islands, Mauritius and Réunion. Uncommon in Natal and Transvaal, but frequent in eastern Zimbabwe amongst rocks and on streambanks in woodland at 900–1 500 m. Map 120.

Vouchers: *Buchanan* s.n. (BOL); *Johnstone* 132 (NU); *Mogg* 14996 (PRE); *Rutherford* 124 (WIND).





HERRAT MARCH



4. *Pellaea boivinii* Hook., Sp. Fil. 2: 147, t. 118A (1858); Sim, Ferns S. Afr. edn 2: 204, t. 93 (1915); Schelpe in Contr. Bolus Herb. 1: 78 (1969); in F. Z. Pterid.: 131 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 274, t. 197 (1983); N. C. Anthony in Contr. Bolus Herb. 11: 243, t. 51 (1984). Type: Madagascar, Nos-sibe, *Boivin* s.n. (K, lecto.!-BOL, microfiche!).

*Pteris boivinii* (Hook.) Bedd., Ferns S. India t. 36 (1865). *Allosorus boivinii* (Hook.) Kuntze, Rev. Gen. 2: 806 (1891).

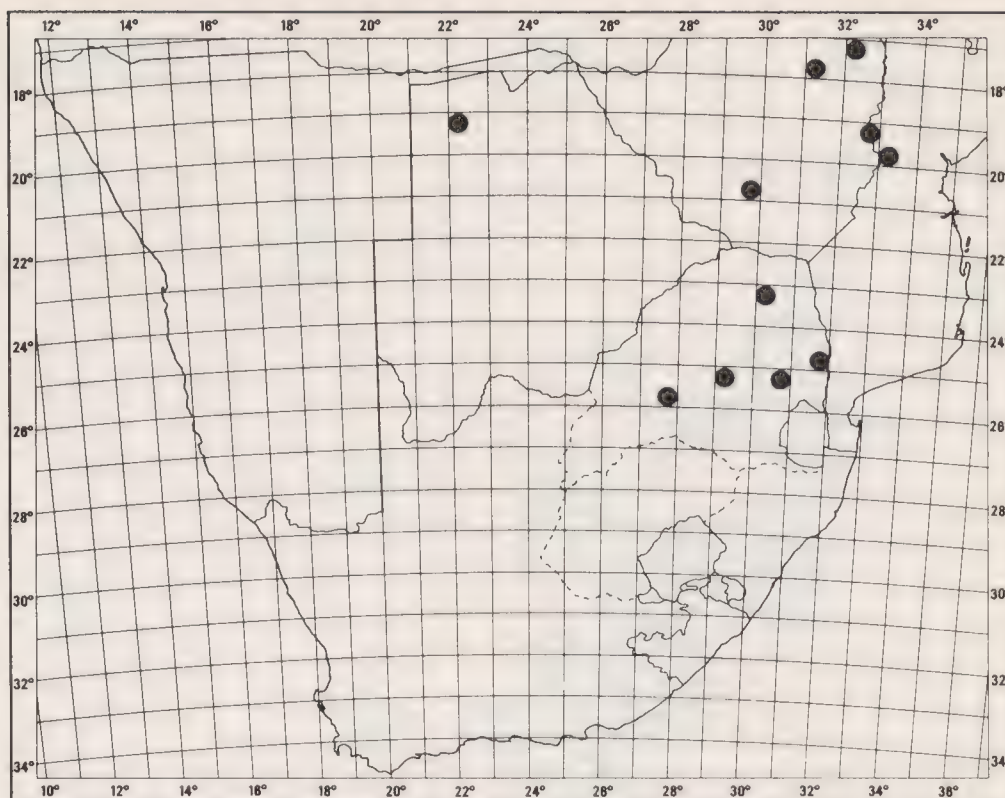
Rhizome suberect, c. 3 mm in diameter, set with nitid castaneous to ferrugineous, narrowly lanceolate-attenuate, minutely serrate rhizome-scales up to 10 mm long with paler margins. *Fronds* erect, coriaceous; *stipe* terete, atrocastaneous, subglabrous at maturity except for upper portion which is pubescent above, and concolorous pale brown scales similar to rhizome-scales basally; *lamina* deltate, up to 180 × 140 mm, 3-pinnate, basal pinnae 2-pinnate and somewhat developed basiscopically; *pinnales* of midpinnae very narrowly oblong-ovate, entire, obtuse, glabrous on both surfaces, c. 10 × 3 mm with cordate base articulated to petiolules; *venation* free, obscure; *rhachis* and *secondary rhachises* terete, atrocastaneous, shortly pubescent with multicellular hairs ventrally, glabrous dorsally. *Sori* linear; *indusium* continuous, erose to entire, membranous, c. 0,3 mm broad. Fig. 47: 2.

Botswana, Transvaal and Natal, as well as Zimbabwe, Zambia, Madagascar, Mauritius, Comoro Islands, Sri Lanka and southern India. In sheltered cliff crevices and around boulder bases, 1 000–1 850 m altitude. Map 121.

Vouchers: *De Joncheere* SAC 288 (PRE); *Jacobsen* 4370 (PRE); *Theron* 1812 (PRE); *Wager* 31 (PRE).

5. *Pellaea pectiniformis* Bak. in Hook. & Bak., Syn. Fil. edn 2: 147 (1874); Schelpe in Contr. Bolus Herb. 1: 77 (1969); in F.Z. Pterid.: 128 (1970); in C.F.A. Pterid.: 104 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 270, t. 192 (1983); N. C. Anthony in Contr. Bolus Herb. 11: 247, t. 52 (1984). Type: Angola, Serra de Oiahoia, *Welwitsch* 191 (K, lecto.!: BM!; LISU!).

*Pteris pectiniformis* Godet ex Mett. in Kuhn, Fil. Afr. 87 (1868), non Goldm. (1843). *Pteridella pectiniformis* (Bak.) Kuhn in Von Deck., Reisen, Bot. 3,3: 13 (1879). *Allosorus pectiniformis* (Bak.) Kuntze, Rev. Gen. 2: 806 (1891).



MAP 121.—*Pellaea boivinii*

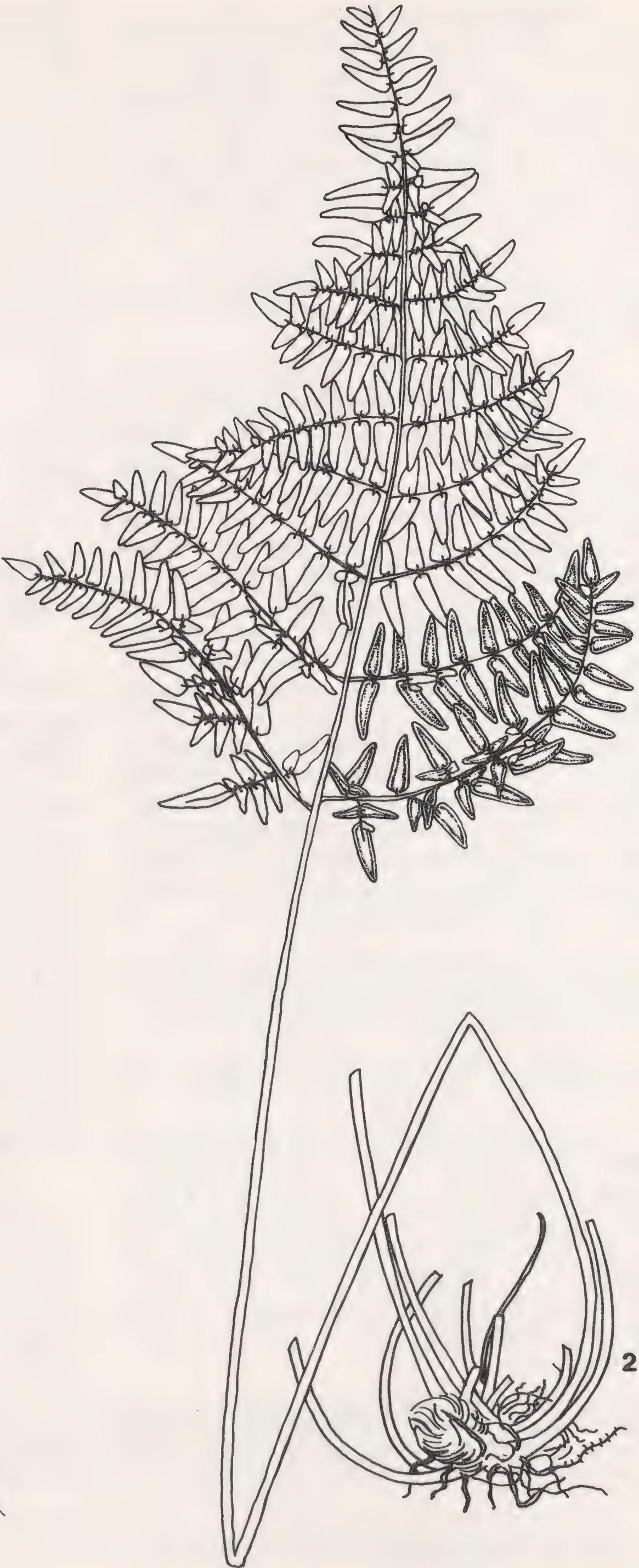
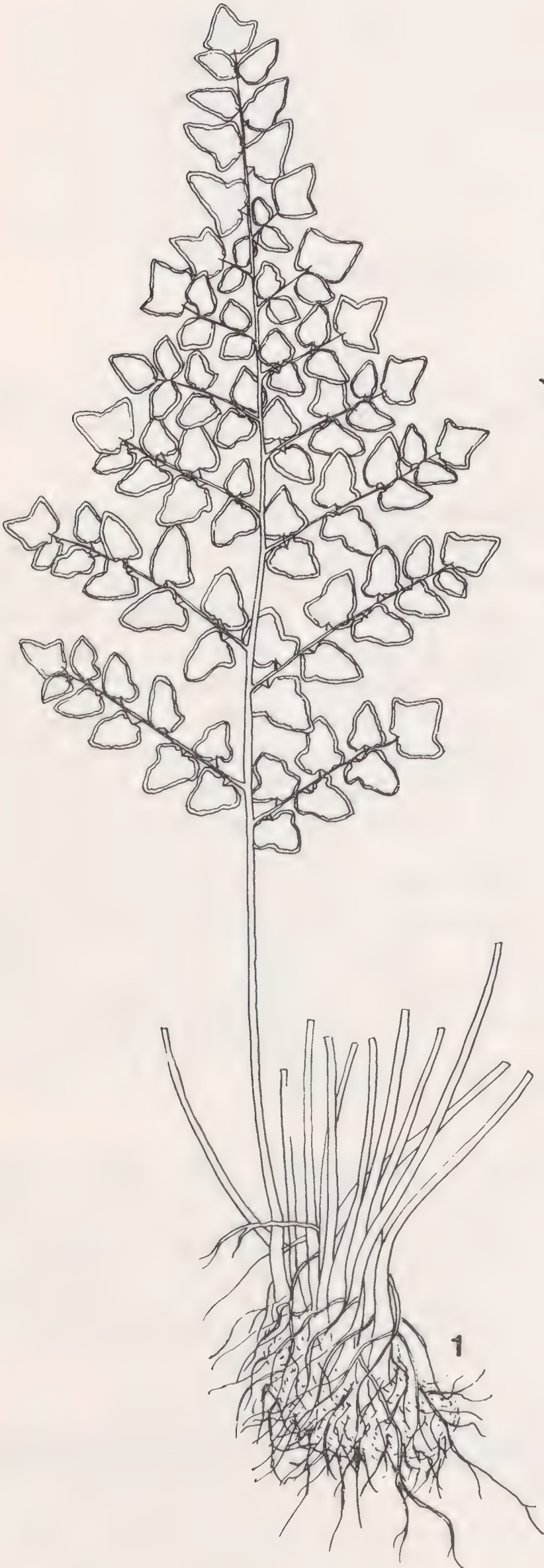
*Pellaea goudotii* C. Chr., Ind. Fil. 480 (1906); Sim, Ferns S. Afr. edn 2: 200, t. 90 (1915). Type as for *P. pectiniformis*.

Rhizome creeping, c. 5 mm in diameter, set with castaneous, minutely serrulate, lanceolate-attenuate rhizome-scales c. 3 mm long, becoming atrocastaneous without paler borders. *Fronds* erect, coriaceous; *stipe* terete, atrocastaneous, thinly pubescent with short appressed hairs and a few subulate scales, becoming glabrous with age; *lamina* narrowly oblong, up to 300 × 90 mm, simply pinnate (basal pinnae undivided); *pinnae* very narrowly linear, obtuse, up to 50 × 1,5 mm, bases cordate, articulated to short atrocastaneous petiolules, upper surface glabrous, under surface set with pale multicellular hairs along costa; *venation* obscure; *rhachis* terete, atrocastaneous, persistently thinly villous. *Sori* linear; *indusium* continuous, pale, membranous, entire to erose, up to 0,2 mm broad. Fig. 46: 1.

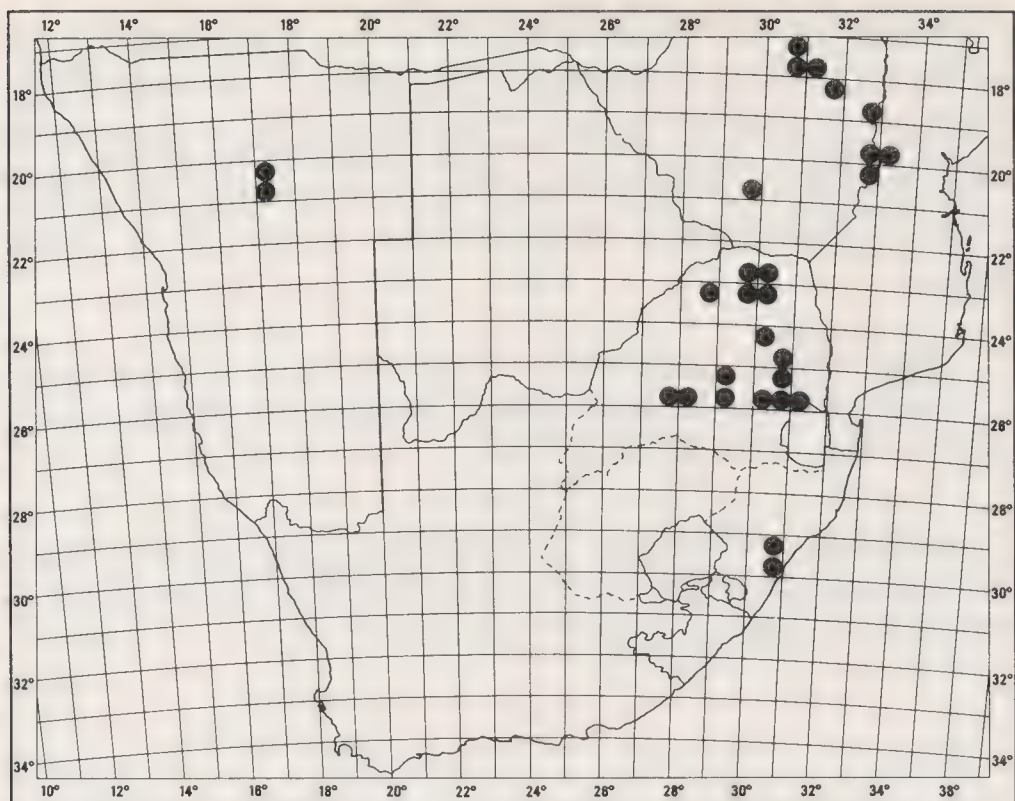
South West Africa/Namibia, Natal, Transvaal, Zimbabwe, Mozambique, Angola, Zambia, Malawi, Zaire, Burundi, Tanzania, Gabon, Madagascar and Comoro Islands. In South West Africa/Namibia *P. pectiniformis* is only known from sheltered sandstone crevices on the summit of the Grosse Waterberg. It is more frequent in Transvaal and Zimbabwe among boulders in light shade c. 1 300 m. Map 122.

Vouchers: *Esterhuysen* 21468 (BM; BOL; PRE); *Killick* 647 (NU); *Rutherford* 130 (WIND); *Schelpe* 4797 (BM; BOL; MO).







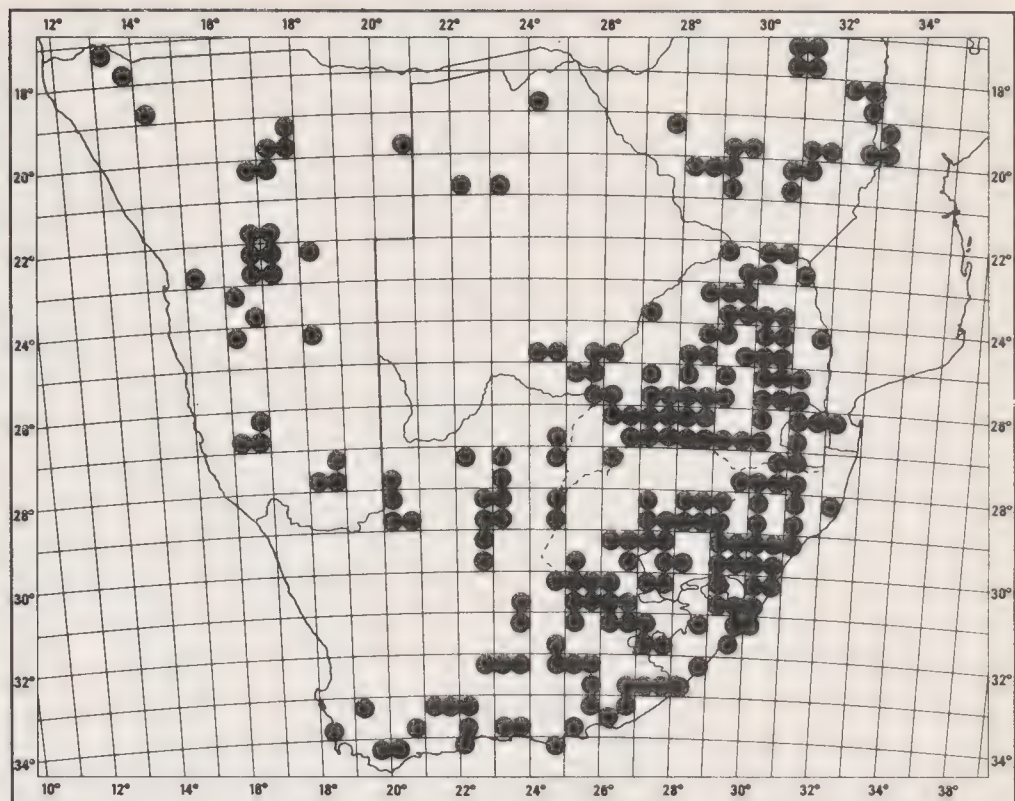
MAP 122.—*Pellaea pectiniformis*

6. *Pellaea calomelanos* (Swartz) Link, Fil. Sp. Hort. Berol. 51 (1841); Launert in F.S.W.A. 7: 6 (1969); Schelpe in Contr. Bolus Herb. 1: 80 (1969); in F.Z. Pterid.: 132, t. 40B (1970); in C.F.A. Pterid.: 108 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 277, t. 43, 200a (1983); N. C. Anthony in Contr. Bolus Herb. 11: 253, t. 53 (1984). Type: Cape Province, Cape Peninsula, *Thunberg* s.n. (UPS, lecto!).

*Pteris calomelanos* Swartz in J. Bot., Gött. 1800, 2: 70 (1801). *Allosorus calomelanos* (Swartz) Presl, Tent. Pterid. 153 (1836). *Platyloma calomelanos* (Swartz) J. Sm. in Curtis's bot. Mag. 72 Comp. 21 (1846). *Notholaena calomelanos* (Swartz) Keys., Polypod. Cyath. Herb. Bunge. 29 (1873).

*Pellaea hastata* sensu Sim, Ferns S. Afr. edn 2: 211, t. 100 (1915).

Rhizome c. 6 mm in diameter, set with linear-lanceolate, attenuate, subentire, atrocastaneous rhizome-scales up to 10 mm long with pale brown margins. *Fron*ds erect to arching, thinly to thickly coriaceous; *stipe* terete, atrocastaneous to ebeneous, subglabrous except for a few scales similar to rhizome-scales basally; *lamina* narrowly ovate to ovate or deltate, up to 430 × 250 mm, 3-pinnate; *pinnules* cordate to broadly hastate with 3 to 5 acute or obtuse points, entire, glaucous, articulated to atrocastaneous or ebeneous petiolules; *venation* free, obscure; *rhachis* and *secondary rhachises* terete, atrocastaneous to ebeneous, with minute hairs. *Sori* forming a marginal line; *indusium* continuous, entire, pale, c. 0,5 mm broad. Fig. 47: 1.

MAP 123.—*Pellaea calomelanos*

Widespread throughout Southern and tropical Africa, as well as Madagascar, Comoro Islands, Réunion, north-east Spain and India. In rocky habitats between 500 and 1 600 m altitude. Map 123.

Vouchers: *Codd & Dyer* 9107 (BOL; PRE); *Dieterlen* 67 (PRE; SAM); 638 (PRE; SAM); *Fisher* 710 (NH; NU; PRE); *Schelpe* 4823 (BM; BOL; MO); 5877 (BOL; PRE).

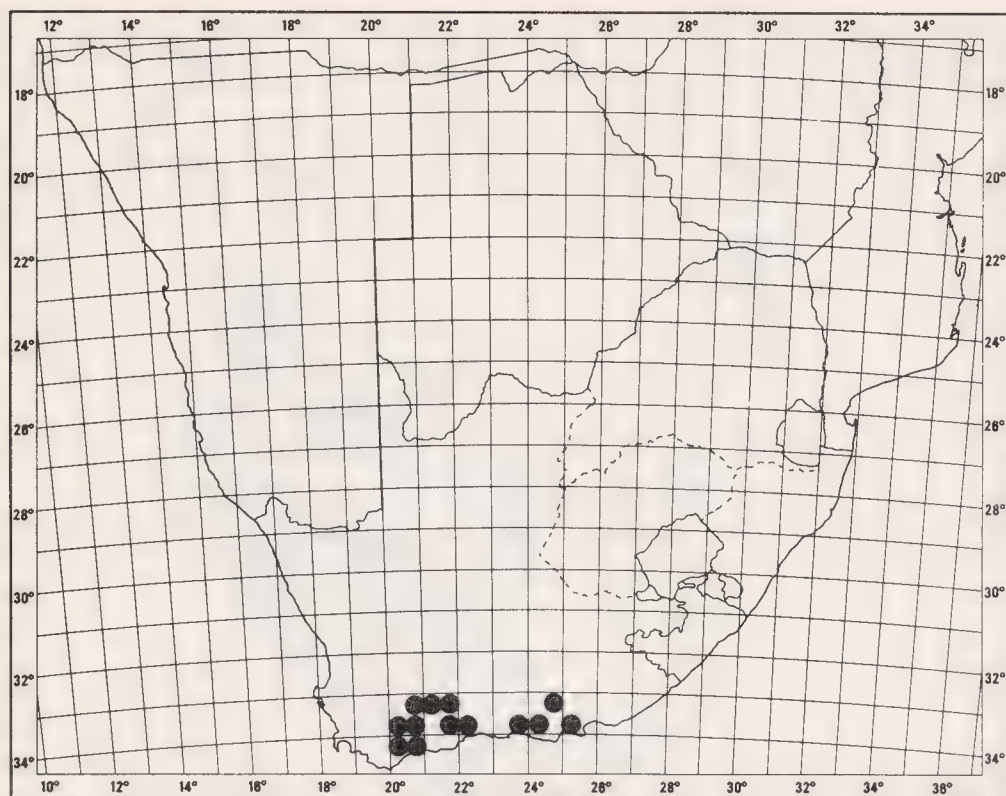
Variety *swynnertoniana* (Sim) Schelpe of Zimbabwe, Mozambique and Malawi has much larger pinnules.

7. *Pellaea leucomelas* (Mett. ex Kuhn) Bak. in Hook. & Bak., Syn. Fil. edn 2: 478 (1874); Sim, Ferns S. Afr. edn 2: 210 (1915); N. C. Anthony in Contr. Bolus Herb. 11: 270, t. 55 (1984). Type: Cape Province, *Breutel* s.n. (LZ, holo. †; B! and BOL!, illustr.).

*Pteris leucomelas* Mett. ex Kuhn, Fil. Afr. 83 (1868). *Pteridella leucomelas* (Mett. ex Kuhn) Mett. ex Kuhn in Von Deck., Reisen, Bot. 3,3: 14 (1879). *Allosorus leucomelas* (Mett. ex Kuhn) Kuntze, Rev. Gen. 2: 806 (1891). *Pellaea calomelanos* var. *leucomelas* sensu W. B. G. Jacobsen, Ferns Sthn Afr. 279 (1983).

Rhizome shortly creeping, c. 2 mm in diameter, set with lanceolate-attenuate, castaneous-ferruginous, subentire rhizome-scales c. 4 mm long with a central atrocastaneous stripe. *Fron*ds erect, coriaceous; *stipe* broadly sulcate, dark brown, glabrous except for a tuft of scales similar to rhizome-scales basally; *lamina* narrowly ovate-deltate, 2- to 3-pinnate, basal pinnae largest; *pinnae* and *pinnules* of lower pinnae oblong-ovate-acute to broadly hastate, margin entire, base cordate to truncate, articulated to short petiolules; *venation* obscure; *rhachis*



MAP 124.—*Pellaea leucomelas*

and secondary rhachises sulcate, dark brown to atrocastaneous-nitidous, glabrous or set with scattered minute hairs. *Sori* borne in a marginal line under revolute margin; *indusium* pale, car-nose-coriaceous, entire, less than 0.2 mm broad.

Endemic to the southern Cape Province. In rock crevices and around boulder bases, usually on north aspect slopes, 600–1 000 m. Map 124.

Vouchers: *Compton* 8583 (NBG); *Esterhuysen* 22920 (BOL); *Levy* 6513 (BOL); 7447 (BOL); 10114 (BOL); *Milewski* 18 (BOL); *Scharf* 1165 (PRE).

## 9. ACTINIOPTERIS

**Actiniopteris** Link, Fil. Sp. 79 (1841); Engl, Pflanzenw. Afr. 2: 45 (1908); Tardieu-Blot in Fl. Madag. 5, 1: 80 (1958); Alston in F.W.T.A. edn 2, Suppl. 44 (1959); Pichi-Sermolli in Webbia 17: 318 (1963); Tardieu-Blot in Fl. Camer. 3: 149 (1964); Launert in F.S.W.A. 4: 1 (1969); Schelpe in F.Z. Pterid.: 136 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 63 (1973); in C.F.A. Pterid.: 110 (1977). Type species: *A. radiata* (Swartz) Link (= *Asplenium radiatum* Swartz).

Rhizome creeping, set with linear, attenuate, entire rhizome-scales with or without a dark central stripe. *Fronds* tufted; *stipe* usually stramineous; *lamina* flabellate to obcuneate, dichotomously divided into linear segments, green or glaucous, under surface with or without scales; fertile fronds usually taller than sterile fronds and sometimes differently dissected; *venation* free. *Sori* borne in a submarginal line; *indusia* continuous, membranous, entire.

A predominantly African genus of 5 species with 2 extending to India.

Fronds uniform or very weakly dimorphic ..... 1. *A. radiata*  
Fronds dimorphic with fertile fronds much taller than sterile fronds ..... 2. *A. dimorpha*

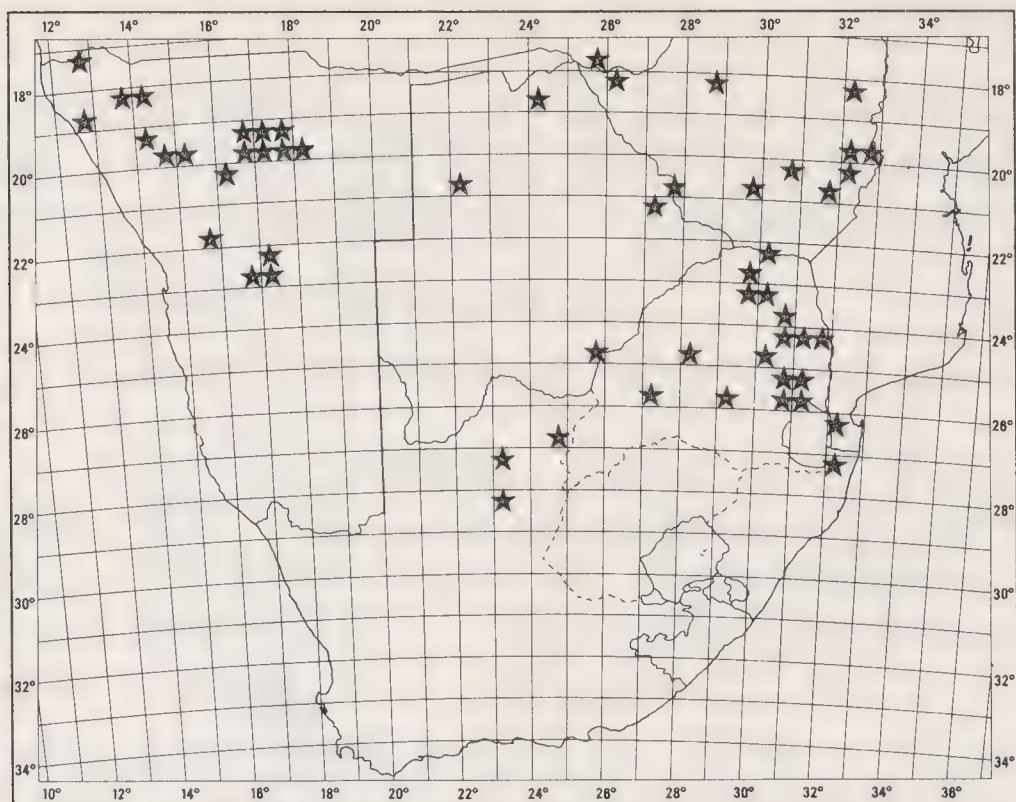
1. **Actiniopteris radiata** (Koenig ex Swartz) Link, Fil. Sp. 80 (1841); Schelpe in Contr. Bolus Herb. 1: 85 (1969); Launert in F.S.W.A. 4: 1 (1969); Schelpe in F.Z. Pterid.: 138, t. 42C (1970); in C.F.A. Pterid.: 111 (1977); W.B.G. Jacobsen, Ferns Sthn Afr. 291, t. 208 (1983). Type: India, Koenig s.n., Herb. Montin (S, lecto.!, BM!).

*Asplenium radiatum* Koenig ex Swartz in J. Bot., Gött. 1800, 2: 50 (1801). *Acrostichum radiatum* (Koenig ex Swartz) Poir. in Lam., Encycl., Suppl. 1: 128 (1810). *Acropteris radiata* (Koenig ex Swartz) Link, Hort. Berol. 2: 56 (1833). *Blechnum radiatum* (Koenig ex Swartz) Presl, Tent. Pterid. 103 (1836). *Pteris radiata* (Koenig ex Swartz) Boj., Hort. Maurit. 399 (1837). *Actiniopteris australis* var. *radiata* (Koenig ex Swartz) C. Chr. in Dansk bot. Ark. 7: 125 (1932).

*Actiniopteris australis* sensu Sim, Ferns S. Afr. edn 2: 250, t. 34 fig. 2 (1915).

Rhizome c. 4 mm in diameter, set with rhizome-scales c. 3 mm long with a central black stripe and pale brown borders, or concolorous. *Fronds* densely tufted, erect, coriaceous, uniform; *stipe* glaucous to stramineous, mostly glabrous, becoming castaneous and bearing a few linear-lanceolate scales basally, up to 135 mm long; *lamina* flabellate with a truncate base, repeatedly dichotomously divided into up to 48 narrow linear segments, entire except for a sharply dentate apex with 2–6 teeth, margins usually reflexed, upper surface with minute, short hairs, under surface set with brown, linear-lanceolate, hair-pointed scales, especially basally; fertile fronds often a little longer than sterile fronds with lamina sharply declinate when desiccated. Fig. 45: 2.



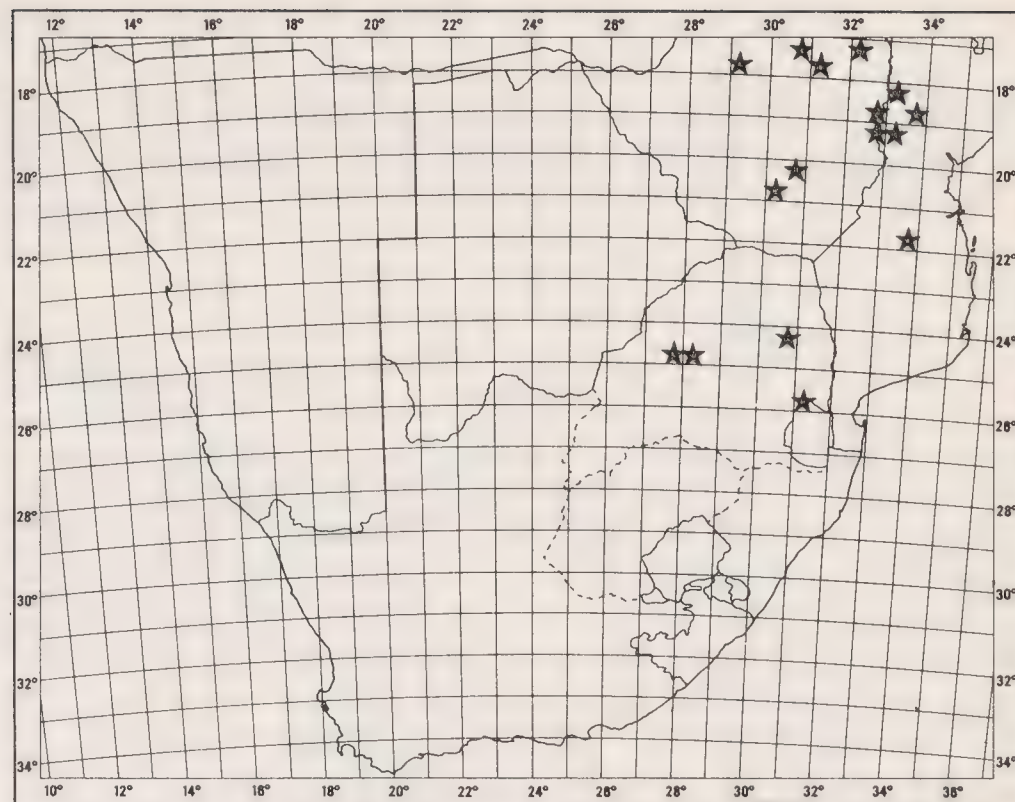
MAP 125.—*Actiniopteris radiata*

Widespread throughout Southern Africa, Angola, Zimbabwe, Zambia, Tanzania, Uganda, Kenya, Somalia, Ethiopia, Sudan, Nigeria, Togo, Cape Verde Islands, Madagascar, Mauritius, Réunion, Egypt, Yemen, Arabia, Persia, Afghanistan, India and Sri Lanka (Pichi-Sermolli, 1962). Around dry rock outcrops, 500–1 800 m. Map 125.

Vouchers: *Brueckner* 383 (BOL; NBG; PRE); *Dinter* 7505 (BOL; PRE); *Galpin* 1243 (BOL; GRA; NH; PRE; SAM); *Schelpe* 4773 (B; BM; BOL; C; K; M; MO; P; PR; PRE; S).

**2. *Actiniopteris dimorpha* Pichi-Sermolli** in *Webbia* 17: 18, t. 2a–c (1962); *Schelpe* in *Contr. Bolus Herb.* 1: 85 (1969); in *F. Z. Pterid.*: 136, t. 42A (1970); W. B. G. Jacobsen, *Ferns Sthn Afr.* 292, t. 208 (1983). Type: Tanzania, Sali, c. 35 km S of Maheye, Ubesi River, *Schlieben* 1938 (BM, holo.).

Rhizome c. 5 mm in diameter, set with rhizome-scales up to 4.5 mm long, some concolorous pale brown, others with a black central stripe and pale borders. *Fronds* densely tufted, erect, coriaceous, dimorphous (sterile fronds half the length of fertile fronds); *stipe* glaucous,

MAP 126.—*Actiniopteris dimorpha*

mostly glabrous, becoming castaneous and bearing a few linear, concolorous pale brown scales basally, up to 190 mm long; *lamina* flabellate, repeatedly dichotomously divided into up to 16 linear glaucous segments, declinate when desiccated, margins usually reflexed, fertile frond segments entire, sterile frond segments with up to 7 teeth at apex, glabrous ventrally but a few persistent, brown, linear, hair-pointed scales dorsally. Fig. 45: 3.

Transvaal, Zimbabwe, Mozambique, Malawi, Zambia, Tanzania, Somalia, Sudan, Madagascar and Réunion. Also Comoro Islands (Pichi-Sermolli, 1962). Common on granite outcrops. Map 126.

Vouchers: *Braithwaite* 188 (BOL); *De Joncheere* s.n. (BOL); *Reynolds* sub *Moss* 20031 (NU).

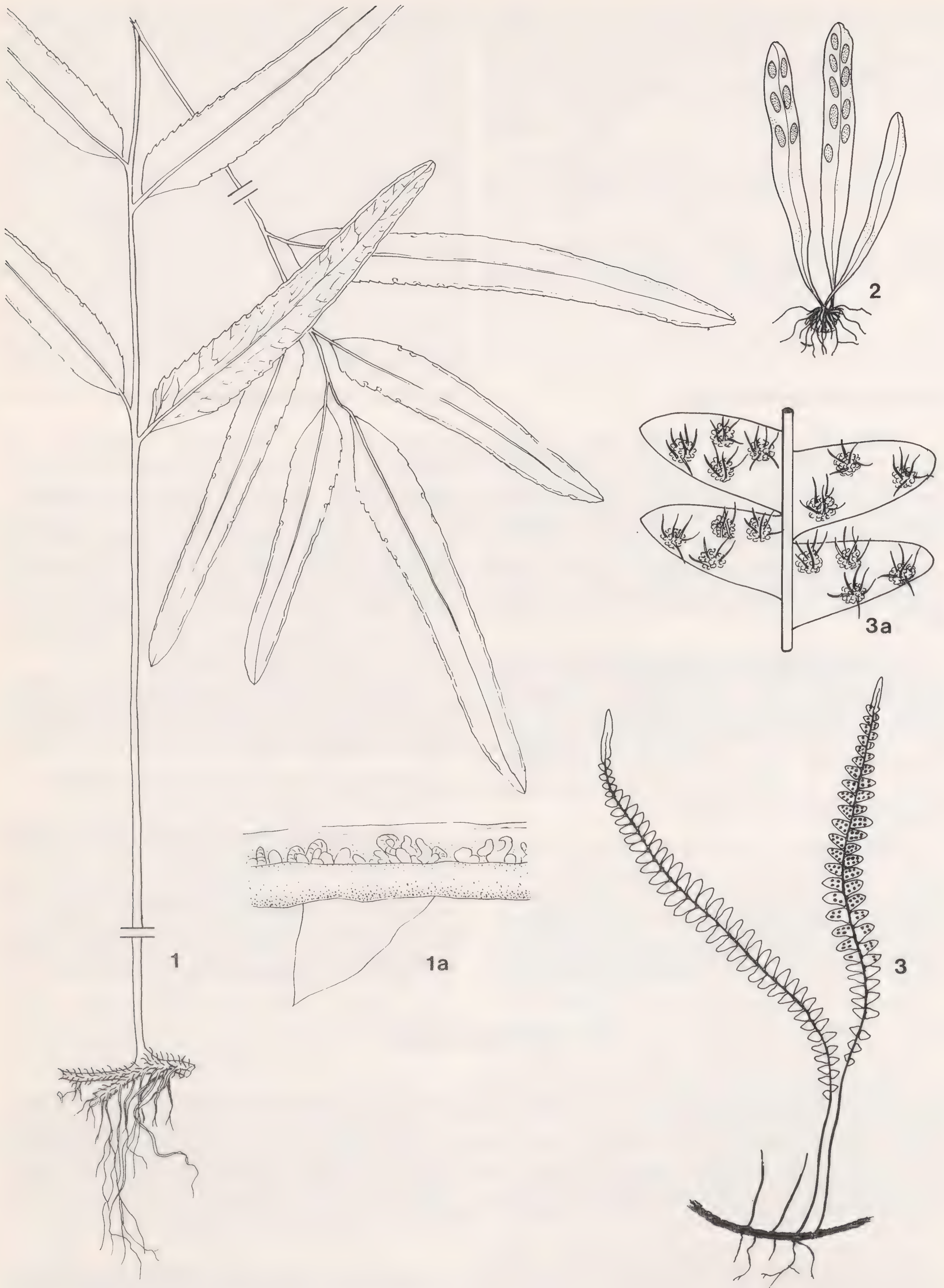
*A. pauciloba* Pichi-Sermolli, which similarly exhibits frond dimorphism and occurs in tropical Africa from Zimbabwe northwards, can be distinguished from *A. dimorpha* by the curved nature of the lower parts of the fertile segments (above the dichotomies) and by the fact that, although the fertile fronds are much longer and larger than the sterile fronds, they are similar in shape, and there is usually only a single tooth at the apex of the sterile segments.

## LINDSAEACEAE

Terrestrial or epiphytic plants. *Rhizome* creeping, protostelic or solenostelic, set with nonpelate rhizome-scales grading into hairs. *Fronds* tufted or spaced; *stipe* not articulated, with two C-shaped vascular strands back to back; *lamina* pinnate to 2-pinnate (rarely simple); *pinnae* symmetrical to dimidiate, glabrous; *venation* free or anastomosing, without included veinlets. *Sori* marginal or submarginal, linear along both margins to oblong only along acroscopic margins of pinnae; *indusium* opening outwards; *paraphyses* absent. *Spores* trilete, without perispore.

Only one genus is recognized as occurring in continental Africa, as the genus *Lindsaea* is construed here in the wide sense. *L. ensifolia* with linear marginal sori has previously been referred to the genera *Schizoloma* Fée and *Schizolegnia* Alston.







## LINDSAEA

**Lindsaea** Dryand. apud J.E. Sm. in Memorie Accad. Sci. Torino 5: 413t. 9,4 (1793); Tardieu-Blot in Fl. Madag. 5, 1: 20 (1958); Schelpe in F. Z. Pterid.: 139 (1970). Type species: *L. guianensis* (Aubl.) Dryand. (= *Adiantum guianense* Aubl.).

Description as for family.

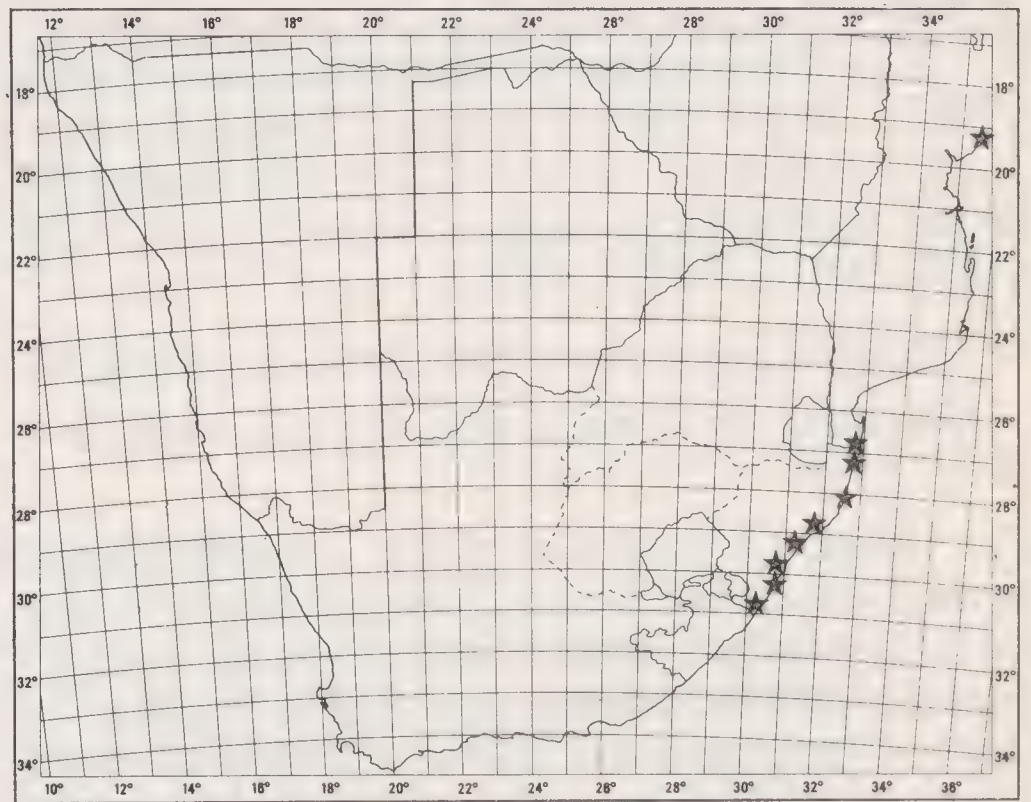
A pantropic genus of about 200 species with only 2 species in continental Africa.

**Lindsaea ensifolia** Swartz in J. Bot., Gött. 1800, 2: 77 (1801); Schelpe in F. Z. Pterid.: 139, t. 43 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 294, t. 210 (1983). Type: Mauritius (S, ?holo.!).

*Schizoloma ensifolia* (Swartz) J. Sm. in J. Bot., Lond. 3: 414 (1841); Sim, Ferns S. Afr. edn 2: 130, t. 39 (1915). *Schizolegnia ensifolia* (Swartz) Alston in Bolm Soc. broteriana, sér. 2, 30: 24 (1956).

*Lindsaea membranacea* Kunze in Linnaea 18: 121 (1844). Type: Natal, Ogles Bush near Durban, *Gueinzus* s.n. (LZ, holo. †; BM!; S!).

Rhizome slender, c. 1,5 mm in diameter, set with dark brown, lanceolate, attenuate, entire rhizome-scales up to 2,5 mm long. *Fron*ds spaced up to 30 mm apart, erect, membranous; *stipe* brown, nitid, up to 360 mm long, glabrous except for scales similar to rhizome-scales at the extreme base; *lamina* up to 450 × 220 mm, simply pinnate; *pinnae* very narrowly oblong-obtuse, up to 125 × 15 mm, entire to shallowly crenate, glabrous on both surfaces, base unequally cuneate; *veins* anastomosing. *Sori* linear, marginal, up to 0,5 mm broad; *indusia* linear, semi-transparent, erose. Fig. 48: 1.



MAP 127.—*Lindsaea ensifolia*

Natal, Mozambique, Nigeria, Madagascar, Mauritius, Pemba and Seychelles. Also recorded by Alston (1959) from Guinea Bissau, Ghana, Gabon, Fernando Po, East Africa and tropical Asia. In swampy forested localities, less frequently on forest streambanks. Map 127.

Vouchers: *Sim* s.n. (PRE); *Strey* 7146 (BOL; NH); *Ward* 718 (BM; NU).

## GRAMMITIDACEAE

Small epiphytic or lithophytic plants with short, erect to widely creeping rhizomes set with narrow, brown to black rhizome-scales. *Stipes* not articulated to the rhizome, often with spreading, multicellular hairs. *Lamina* simple, pinnatifid, pinnate to 2-pinnatifid, with entire lobes, glabrous or set with hairs, or rarely with chalky white vesicles; *veins* simple or forked, not anastomosing. *Sori* round to elliptic, exindusiate, superficial. *Spores* trilete.

Fron

ds simple, entire to subentire ..... 1. **Grammitis**

Fron

ds pinnatifid more than halfway to midrib ..... 2. **Xiphopteris**

### 1. GRAMMITIS

**Grammitis** Swartz in J. Bot., Gött. 1800, 2: 3, 17 (1801); Tardieu-Blot in Mém. Inst. fr. Afr. noire 28: 210 (1953); in Fl. Madag. 5, 2: 71 (1960); Schelpe in F. Z. Pterid.: 141 (1970). Lectotype species: *G. marginella* (Swartz) Swartz (= *Polypodium marginellum* Swartz).

Fig. 48.—1, *Lindsaea ensifolia*, part of plant, × 0,6; 1a detail of portion of fertile margin, × 30 (*Strey* 7146), 2, *Grammitis poeppigiana*, plant × 1,2 (*Wicht* 148), 3, *Xiphopteris flabelliformis*, part of plant, × 0,6; 3a, detail of lower surface of pinnae, × 3,6 (*Mitchell* 534).



Small epiphytic or lithophytic plants. *Rhizomes* shortly creeping or suberect, set with brown rhizome-scales. *Fronde*s linear to narrowly spatulate, entire to shallowly crenate, glabrous or set with multicellular hairs, membranous to coriaceous; *veins* forked, free. *Sori* round to elongate, in a row on either side of midrib.

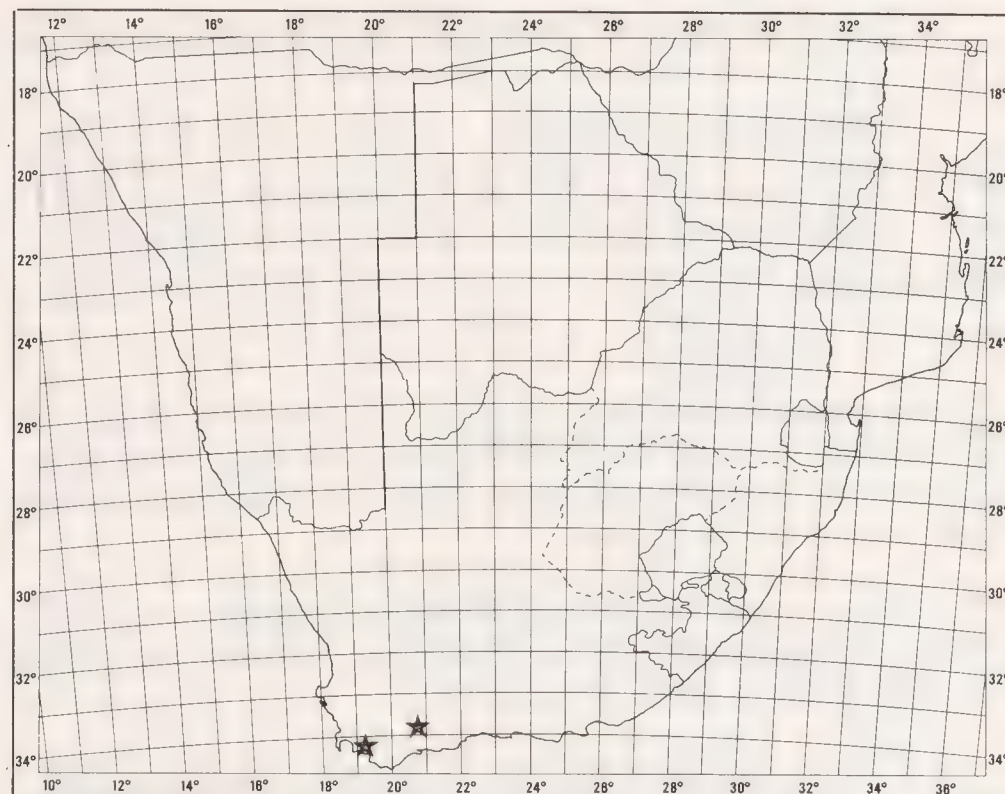
A genus of about 150 species distributed throughout the tropics and southern hemisphere.

**Grammitis poeppigiana** (Mett.) Pichi-Sermolli in Webbia 32, 2: 461 (1978); Rourke & Schelpe in Jl S. Afr. Bot. 44: 419 (1978); W. B. G. Jacobsen, Ferns Sthn Afr. 297, t. 213 (1983). Type: Cape Province, Hottentots Holland, *Gueinzius* s.n. (LZ†); Stellenbosch, Jonkershoek, Victoria Peak, *Esterhuysen* 29290 (BOL, neo.!, E!; K!; MO!).

*Polypodium poeppigianum* Mett., Farngatt. 1: 37 (1875).

*Polypodium magellanicum* sensu Alston & Schelpe in Jl S. Afr. Bot. 18: 163, 175 (1952).

Rhizome shortly creeping, set with deltate-acuminate, membranous, brown rhizome-scales c. 2 mm long. *Fronde*s closely spaced, sessile; *lamina* rounded-oblong, tapering to the base, c. 35 × 4 mm, glabrous above, set with scattered tubular, sometimes branched, unicellular to multicellular scales below, becoming glabrous with age; *venation* obscure, midrib convex below. *Sori* elongate, up to 2.5 mm long, set in a line on either side of midrib, each at an angle of c. 20° to midrib. Fig. 48: 2.



MAP 128.—*Grammitis poeppigiana*

*G. poeppigiana* is known only from two peaks in the south-western Cape Province where it occurs in south aspect sandstone crevices at about 1 700 m altitude. Map 128.

Vouchers: *Esterhuysen* 29490 (BOL); *Wicht* 148 (BM; BOL).

## 2. XIPHOPTERIS

**Xiphopteris** Kaulf. in Berl. Jb. Pharm. 21: 35 (1820); Tardieu-Blot in Mém. Inst. fr. Afr. noire 28: 207 (1953); Alston in F. W. T. A. edn 2, Suppl. 45 (1959); Tardieu-Blot in Fl. Madag. 5, 2: 80 Fl (1960); in Fl. Gabon 8: 191 (1964); in Fl. Camer. 3: 324 (1964); Schelpe in F. Z. Pterid.: 141 (1970). Lectotype species: *X. serrulata* (Swartz) Kaulf. (= *Acrostichum serrulatum* Swartz).

Small epiphytic or lithophytic plants with short, erect to widely creeping rhizomes, set with brown to grey-brown rhizome-scales. *Fronde*s linear, deeply pinnatifid, glabrous or villous. *Sori* 1–8 per lobe, round to oval, with or without paraphyses.

A genus of over 200 species distributed throughout the tropics.

**Xiphopteris flabelliformis** (Poir.) Schelpe in Bolm Soc. broteriana, sér. 2, 41: 217 (1967); in Contr. Bolus Herb. 1: 10 (1969); in F. Z. Pterid.: 143, t. 44B (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 298, t. 214 (1983). Type: Réunion, *Commerson* s.n., Herb. Jussieu (P, lecto.).

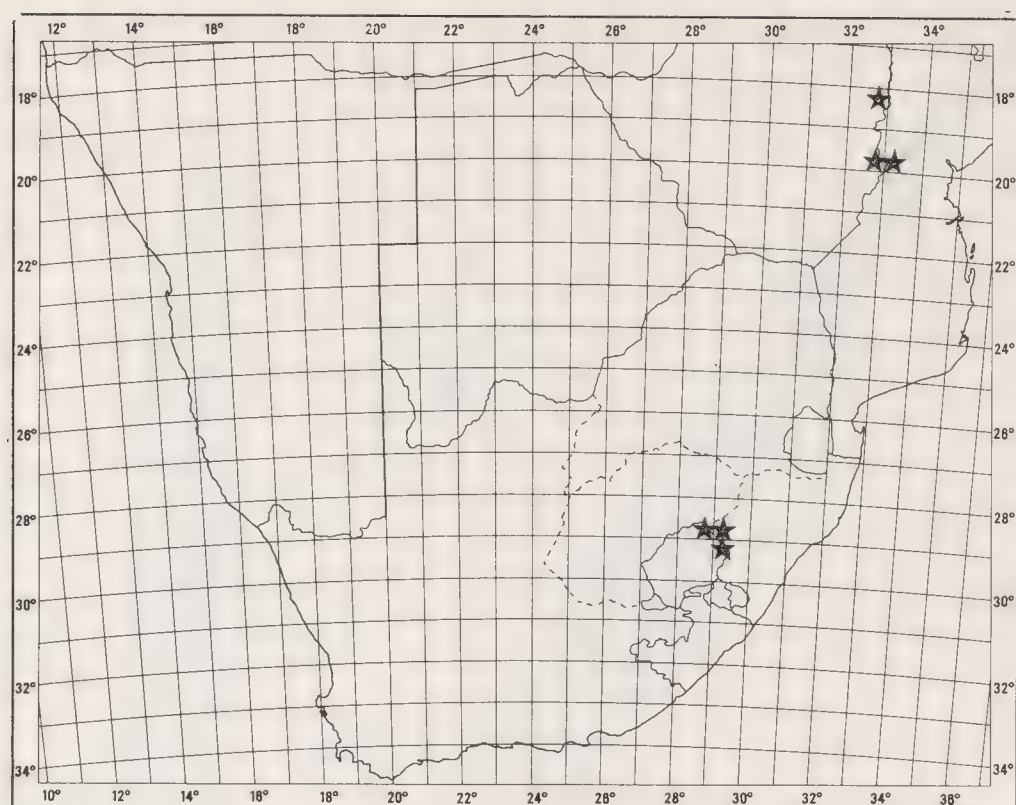
*Polypodium flabelliforme* Poir. in Lam., Encycl. 5: 519 (1804). *Grammitis flabelliformis* (Poir.) Morton in Contr. U. S. Nat. Herb. 38: 57 (1967).

Rhizome creeping, set with metallic grey-brown, lanceolate, acuminate rhizome-scales

up to 4 mm long. *Fronde*s spaced, pinnatifid, subcoriaceous to coriaceous; *stipe* light brown to black, very narrowly winged, up to 60 mm long; *lamina* linear, up to 210 × 10 mm, glabrous on both surfaces, decrescent below, pinnatifid to midrib into rounded oblong to quadrate lobes up to 6 mm long; *venation* usually obscure; *midrib* black. *Sori* 1–6 per lobe, intramarginal, set with castaneous hair-like paraphyses. Fig. 48: 3.

Natal, Zimbabwe, Mozambique, Malawi, Tanzania, Uganda, Kenya, Cameroun, Fernando Po, Réunion. Although *X. flabelliformis* occurs most frequently as an epi-



MAP 129.—*Xiphopteris flabelliformis*

phyte on the tropical African mountains it appears to be confined to rock crevices and ledges in both the mountains of eastern Zimbabwe and in the Natal Drakensberg. In the Drakensberg it only occurs near the summit of the basalt escarpment between altitudes of 2 700 and 3 100 m. Map 129.

Vouchers: *Esterhuysen* 20244, 26086 (BM; BOL); *Schelpe* 2000 (BM; BOL; NH; NU; PRE).

The plants found in Southern Africa are generally much smaller than those from tropical Africa.

## POLYPODIACEAE

Epiphytic or less frequently terrestrial plants, with creeping or climbing rhizomes set with peltate often clathrate rhizome-scales. *Fronde*s simple or pinnatifid to pinnate, often articulated to the rhizome; *venation* anastomosing to form areoles with included veinlets. *Sori* round, elongate or acrostichoid, without or more rarely with paraphyses, exindusiate. *Sporangia* with long stalks; *spores* monolet, without perispore. *Gametophytes* thalloid, cordate or elongate.

- 1a Fronds set with numerous stellate hairs ..... 1. **Pyrrosia**
- 1b Fronds without stellate hairs:
  - 2a *Sori* elongate, linear ..... 2. **Loxogramme**
  - 2b *Sori* round:
    - 3a Fronds simple:
      - 4a Soral paraphyses peltate, conspicuous in young sori ..... 5. **Pleopeltis**
      - 4b Soral paraphyses absent:
        - 5a Only costal areoles with included veinlets; epiphyte with long scandent rhizomes ..... 6. **Microgramma**
        - 5b All areoles with included veinlets; lithophytic or terrestrial ..... 7. **Microsorium**
    - 3b Fronds pinnatifid:
      - 6a Veins free ..... 3. **Polypodium**
      - 6b Veins anastomosing:
        - 7a Soral paraphyses not peltate; mature lamina very deeply pinnatifid ..... 5. **Microsorium**
        - 7b Soral paraphyses peltate; mature lamina shallowly lobed ..... 4. **× Pleopodium**

### 1. PYRROSIA

**Pyrrosia** *Mirb.* in Lam. & *Mirb.*, Hist. Nat. Vég. 3: 471; 5: 91 (1802); Schelpe in Jl S. Afr. Bot. 18: 123 (1952); Tardieu-Blot in Mém. Inst. fr. Afr. noire 28: 224 (1953); Alston in F. W. T. A. edn 2, Suppl. 46 (1959); Tardieu-Blot in Fl. Madag. 5, 2: 102 (1960); in Fl. Gabon 8: 200 (1964); in Fl. Camer. 3: 338 (1964); Schelpe in F. Z. Pterid.: 146 (1960); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 64 (1973); in C. F. A. Pterid.: 114 (1977). Type species: *P. chinensis* *Mirb.*

Rhizome creeping slender, set with non-clathrate rhizome-scales. *Fronde*s simple, entire, carnose-coriaceous, articulated, covered with stellate hairs — the upper surface becoming glabrous with age. *Sori* round, borne in upper half of frond in numerous closely set rows on both sides of midrib, densely set at first with stellate hairs.

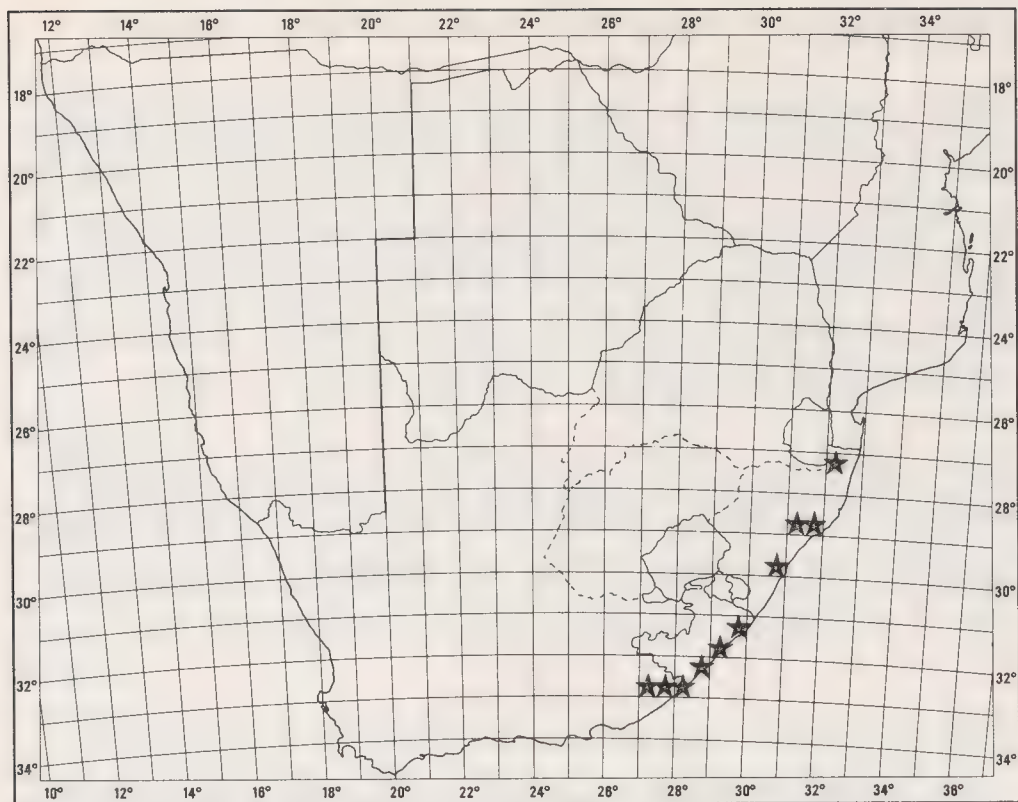
A mainly tropical genus of about 80 species in the Old World.

- Stellate hairs on frond with long thin brownish arms; rhizome-scales laciniate ..... 1. *P. africana*
- Stellate hairs on frond with short flat white arms; rhizome-scales entire ..... 2. *P. schimperiana*







MAP 130.—*Pyrrosia africana*

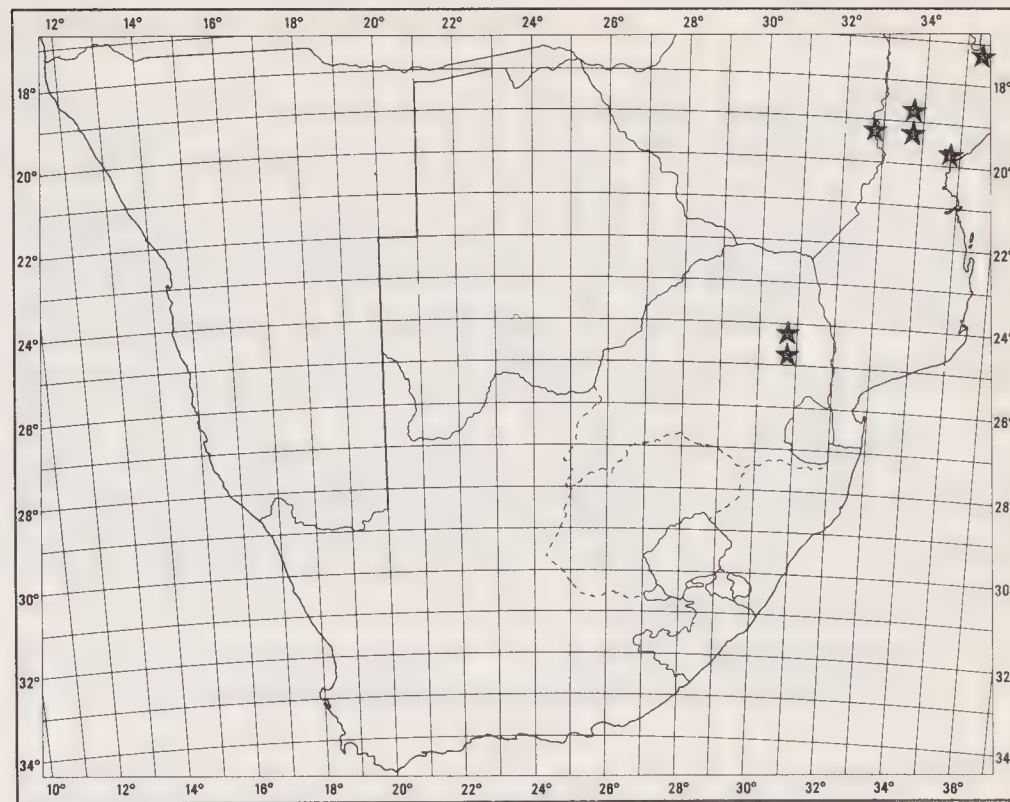
1. *Pyrrosia africana* (Kunze) Ballard in Kew Bull. 1937: 349 (1937); Schelpe in Jl S. Afr. Bot. 18: 124 (1952); W. B. G. Jacobsen, Ferns Sthn Afr. 303, t. 36, 218 (1983). Type: Transkei, between Umtata and Umgazana, Drège s.n. (LZ, holo.†; BM!; K!; OXF!).

*Nipholobolus africanus* Kunze in Linnaea 10: 501 (1839). *Gyrosorium africanum* (Kunze) Presl, Epim. Bot. 140 (1849). *Polypodium africanum* (Kunze) Mett., Farngett. 1: 131, t. 3 figs 11, 12 (1857), non Desv. (1827). *Cyclophorus africanus* (Kunze) C. Chr., Ind. Fil. 197 (1905); Sim, Ferns S.Afr. edn 2: 283, t. 145 fig. 1 (1915).

Rhizome creeping, 3–4 mm in diameter, set with dull pale brown, ovate-lanceolate, laciniate rhizome-scales up to  $8 \times 3$  mm. *Fronde* erect to arching, spaced 2–14 mm apart; *stipe* tomentose, becoming glabrous with age, up to 25 mm long; *lamina* narrowly lanceolate to narrowly oblanceolate, acuminate,  $56\text{--}300 \times 11\text{--}30$  mm, base narrowly cuneate decurrent, margin entire, narrowly recurved, lower surface tomentose with ferrugineous, uniform, stellate hairs with arms up to 0.9 mm long, upper surface becoming glabrous with age. *Sori* round, usually emergent through tomentum. Fig. 49: 1.

Endemic to the south-eastern parts of Southern Africa where it occurs as an epiphyte, sometimes on cycads, and also as a lithophyte. From near sea level in eastern Cape Province to up to 600 m in Natal. Map 130.

Vouchers: D'Urban s.n. (BOL; K; OXF); Strey 8381, 8583 (BOL; NH); Thode A12576 (NH; PRE).

MAP 131.—*Pyrrosia schimperiana*

2. *Pyrrosia schimperiana* (Mett. ex Kuhn) Alston in J. Bot., Lond. 72, Suppl. 2: 8 (1934); Schelpe in Jl S. Afr. Bot. 18: 128, t. 1 fig. 4, t. 2 fig. 2 (1952); in Contr. Bolus Herb. 1: 90 (1969); in F.Z. Pterid.: 147, t. 45A (1970); in C.F.A. Pterid.: 114 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 304, t. 220 (1983), as *schimperana* throughout. Type: Ethiopia, Dscha-Dsche, Schimper 1441 (B, holo.).

*Polypodium schimperianum* Mett. ex Kuhn, Fil. Afr. 152 (1868), as *schimperanum*. *Nipholobolus schimperianus* (Mett. ex Kuhn) Giesenh., Nipholobolus 112 (1901), as *schimperanus*. *Cyclophorus schimperianus* (Mett. ex Kuhn) C. Chr., Ind. Fil. 200 (1905), as *schimperanus*.

Rhizome creeping, c. 2 mm in diameter, set with brown, ovate-cucullate to lanceolate-acuminate, entire, rhizome-scales up to 6 mm long. *Fronde* spaced up to 10 mm apart, car-nose-coriaceous; *stipe* tomentose, becoming glabrous with age, up to 28 mm long; *lamina* linear-lanceolate, narrowly elliptic to oblanceolate, acute to acuminate, up to  $280 \times 14$  mm, base narrowly cuneate-decurrent, both surfaces tomentose with grey or greyish brown stellate hairs with short, flattened arms. *Sori* emergent through tomentum. Fig. 49: 2.

Eastern Transvaal, Mozambique, Zimbabwe, Angola, Malawi, Zambia, Zaire, Kenya, Uganda, Tanzania, Ethiopia, Sudan, Cameroun and Nigeria. Lithophytic on shaded boulders in eastern Transvaal, but usually found as an epiphyte in tropical Africa, 400–1 300 m. Map 131.

Vouchers: Van der Schijff 5505 (K); 5638 (BOL).

FIG. 49.—1, *Pyrrosia africana*, part of plant,  $\times 0.6$ ; 1a, lamina scale,  $\times 30$  (Pegler 303). 2, *Pyrrosia schimperiana*, part of plant,  $\times 0.6$ ; 2a, lamina scale,  $\times 30$  (Schelpe & Leach 7007). 3, *Loxogramme lanceolata*, part of plant,  $\times 0.6$  (Braithwaite 152).



## 2. LOXOGRAMME

**Loxogramme** (*Blume*) *Presl*, Tent. Pterid. 214 (1836), reimpr. in Abh. K. Böhm. Ges. Wiss., ser. 4, 5: 214, t. 9 fig. 8 (1837); Tardieu-Blot in Mém. Inst. fr. Afr. noire 28: 211 (1953); Alston in F.W.T.A. edn 2, Suppl. 48 (1959); Tardieu-Blot in Fl. Madag. 5, 2: 118 (1960); in Fl. Gabon 8: 204 (1964); in Fl. Camer. 3: 342 (1964); Schelpe in F.Z. Pterid.: 149 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 65 (1973); in C.F.A. Pterid.: 116 (1977). Lectotype species: *L. lanceolata* (Swartz) *Presl* (= *Grammitis lanceolata* Swartz).

Rhizome slender, bearing masses of hairy roots and set with greyish, clathrate rhizome-scales. *Fronde*s simple, usually entire, carnose-coriaceous, glabrous, with immersed, freely anastomosing veins without included veinlets. *Sori* elongate, set at an angle to midrib, superficial, without paraphyses.

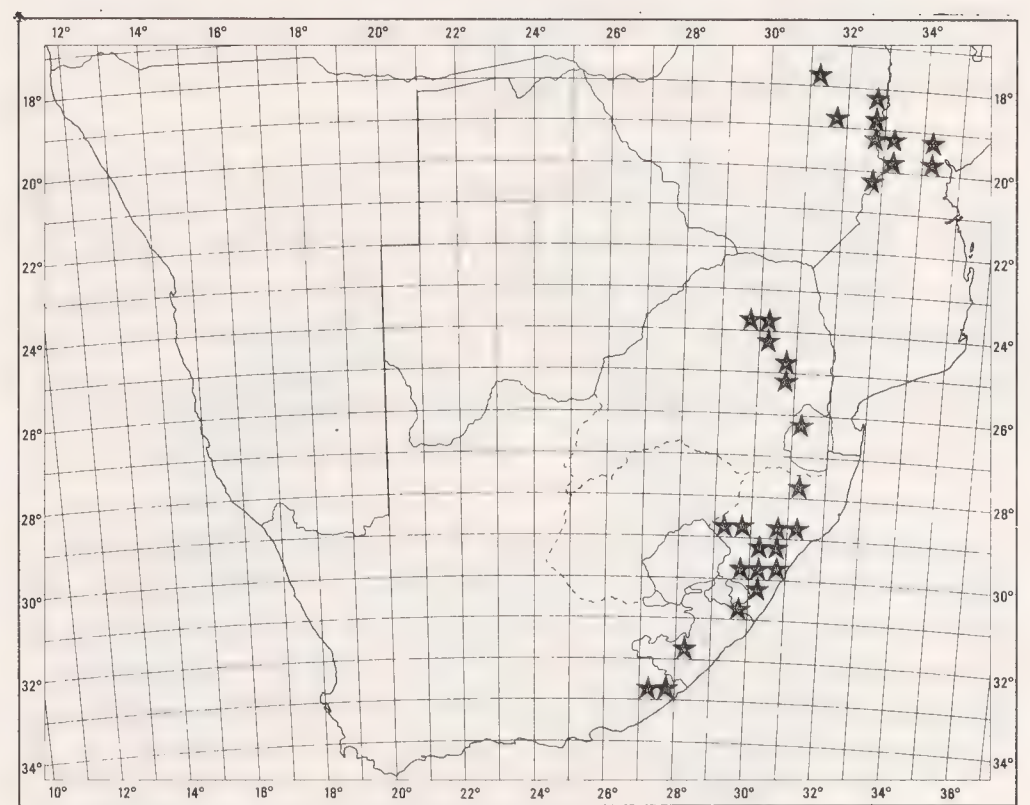
A genus of about 35 species, mainly Asiatic.

**Loxogramme lanceolata** (Swartz) *Presl*, Tent. Pterid. 215, t. 9 fig. 8 (1836), reimpr. in Abh. K. Böhm. Ges. Wiss., ser. 4, 5: 215, t. 9 fig. 8 (1837); Schelpe in Contr. Bolus Herb. 1: 94 (1969); in F.Z. Pterid.: 149, t. 48E (1970); in C.F.A. Pterid.: 116, t. 20Z (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 306, t. 222 (1983). Type: Herb. Swartz (SBT, lecto.).

*Grammitis lanceolata* Swartz in J. Bot., Gött. 1800, 2: 18 (1801). *Antrophyum lanceolatum* (Swartz) Blume, Fl. Jav. Fil. 84, t. 36 (1829). *Selliguea lanceolata* (Swartz) Fée, Mém. Fam. Foug. 5: 177 (1852). *Gymnogramma lanceolata* (Swartz) Hook., Sp. Fil. 5: 156 (1864).

*Polypodium loxogramme* Mett. in Abh. senckenb. naturforsch. Ges. 2: 112 (1856), reimpr. in Mett., Farngatt. 1: 112 (1857); Sim, Ferns S. Afr. edn 2: 281, t. 146 (1915). Type: As for *Grammitis lanceolata*.

Rhizome widely creeping, bearing reddish brown, hairy roots and set with dark grey brown, narrowly lanceolate, acuminate, pseudoserrate rhizome-scales. *Fronde*s spaced up to 50 mm apart; *stipe* stramineous to purplish brown, up to 30 mm long; *lamina* narrowly elliptic, up to 330 × 28 mm, entire to irregularly sinuate; *midrib* and *veins* immersed. *Sori* linear, set at an angle of c. 15° to midrib, up to 23 × 2.5 mm at maturity, overlapping for less than a quarter of their length. Fig. 49: 3.



MAP 132.—*Loxogramme lanceolata*

Sporadic throughout the montane forests of the eastern parts of Southern Africa and northwards to Zimbabwe, Mozambique, Angola, Malawi, Zambia, Zaire, Tanzania, Kenya, Uganda, Ethiopia, Socotra, Sudan, Cameroun, Nigeria, Togo, Ghana, Ivory Coast, Liberia, Sierra Leone, São Tomé, Madagascar, Comoro Islands, Mauritius and Réunion. A low-level epiphyte, or a lithophyte in moist and very deeply shaded localities, 900–2 500 m. Map 132.

Vouchers: *Fisher* 807 (NU; PRE); *Schweickerdt* s.n. (PRE; STE); *Strey* 9403 (BOL; NH).

M. G. Price (priv. comm.) has suggested that the specimen in Herb. Swartz, annotated by Swartz, in SBT should be designated as the lectotype.

## 3. POLYPODIUM

**Polypodium** L., Sp. Pl. 1082 (1753); Gen. Pl. edn. 5: 485 (1754); Engl., Pflanzenw. Afr. 2: 50 (1908); Tardieu-Blot in Mém. Inst. fr. Afr. noire 28: 223 (1953); Schelpe in F.Z. Pterid.: 158 (1970). Lectotype species: *P. vulgare* L.

Rhizome creeping, set with very narrowly to broadly lanceolate rhizome-scales. *Fronde*s spaced, stipitate, articulated, usually pinnatifid, glabrous or paleate; *veins* free or anastomosing to form areoles, each with a single included veinlet. *Sori* round, superficial, without paraphyses.



A predominantly northern hemisphere genus of about 75 species with two species in Africa.

Fronds glabrous on both surfaces ..... 1. *P. vulgare*  
Fronds with scattered peltate scales on under surface ..... 2. *P. polypodioides* subsp. *ecklonii*

1. ***Polypodium vulgare* L.**, Sp. Pl. 2: 1085 (1753); Sim, Ferns S. Afr. edn 2: 270, t. 135 (1915); W. B. G. Jacobsen, Ferns Sthn Afr. 317, t. 231 (1983). Type: Europe (Not found).

*Ctenopteris vulgaris* (L.) Newm. in Phytologist 2: 276 (1846).

*Polypodium vulgare* var. *eatonii* Bak. in Phil. Trans. R. Soc. 168: 23 (1879). Type: Kerguelen, *Eaton* s.n. (K, holo.!).

Rhizome 2–4 mm in diameter, set with lanceolate acuminate, entire, concolorous brown rhizome-scales up to 5 mm long. *Fronds* erect, firmly herbaceous, spaced up to 10 mm apart; *stipe* stramineous to pale brown, glabrous, 18–170 mm long; *lamina* ovate-oblong to narrowly oblong-acute, 30–230 × 22–88 mm, pin-

natifid to very near midrib into narrowly oblong to linear, obtuse to acute, entire (except for regular minute notches) lobes up to 45 × 7 mm, glabrous on both surfaces; *midrib* convex on both surfaces. *Sori* up to 22 per lobe, placed about halfway between costa and margin, up to 3 mm in diameter. Fig. 50: 3.

Cape Province, Lesotho and Natal, as well as Kerguelen Island and northern Europe. Terrestrial; commonly on south aspect slopes in rocky habitats, 800–2 100 m. Map 133.

Vouchers: *Clarkson* 132 (BM; NH; NU); *Esterhuysen* 15079 (BOL; NBG); 25702 (BM; BOL; NBG).

2. ***Polypodium polypodioides* (L.) Hitchc.**, Rep. Mo. Bot. Gdn 4: 156 (1893). Iconotype: Plukenet, Alm. bot. 153 (1696), t. 289 (1694), from Jamaica. Probable holotype: Herb. Sloane 130, fol. 29 (BM!).

Subsp. *ecklonii* (*Kunze*) *Schelpe* in Jl S. Afr. Bot. 30: 189 (1964); in Contr. Bolus Herb. 1: 103 (1969); in F.Z. Pterid.: 158 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 318, t. 37, 232 (1983). Type: Transkei, between the Basher and Kei Rivers, *Drège* s.n. (LZ, syn.†; B, lecto.!).

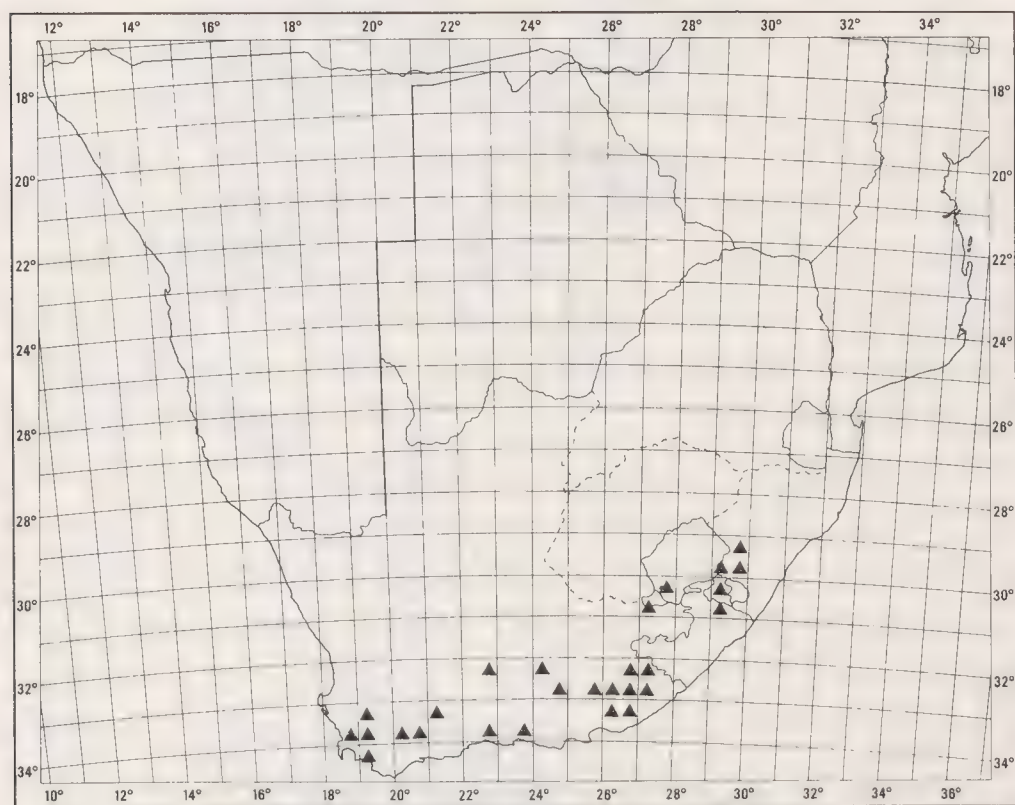
*Polypodium ecklonii* Kunze in Linnaea 10: 498 (1836).

*Polypodium polypodioides* sensu Sim, Ferns S. Afr. edn 2: 271, t. 136 (1915).

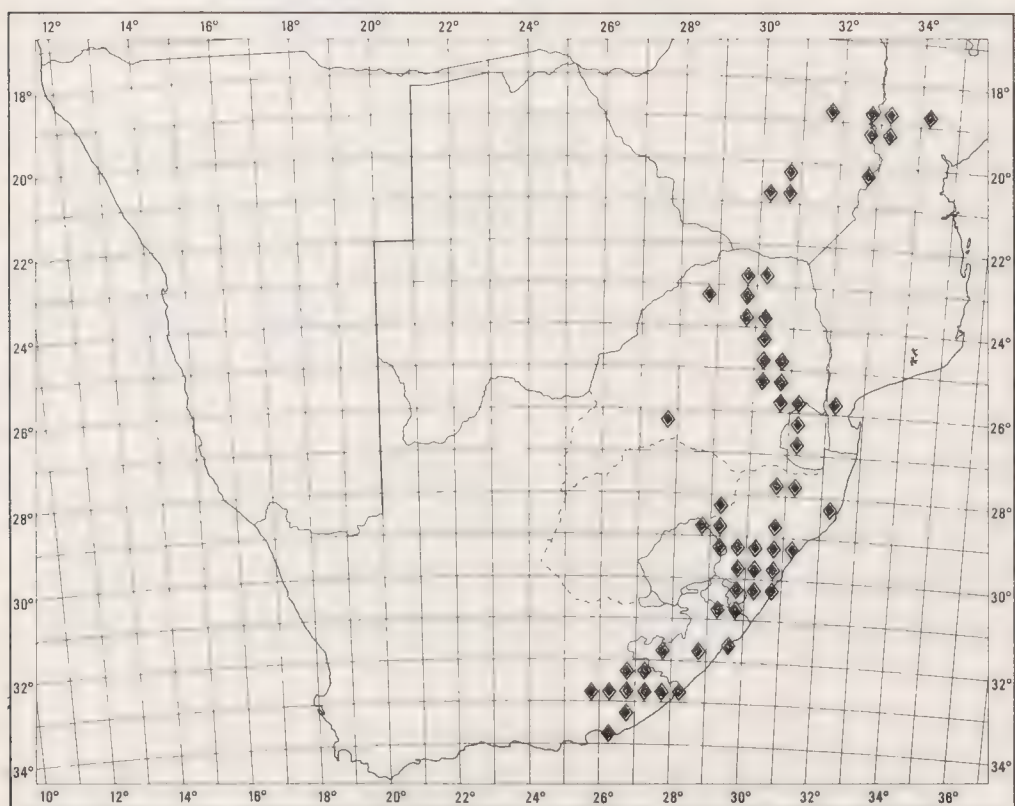
Rhizome c. 1,5 mm in diameter, set with subulate, entire, brown rhizome-scales with a dark clathrate area basally, up to 3 mm long. *Fronds* usually spaced 10 mm apart; *stipe* up to 60 mm long, covered at first with ovate to lanceolate scales up to 2 mm long; *lamina* lanceolate-oblong, up to 150 × 55 mm, pinnatifid to near midrib into linear, entire to slightly sinuate lobes up to 25 × 4 mm, upper surface glabrous, lower surface covered with circular to broadly lanceolate, grey scales up to 1 mm long, with a dark centre at maturity. *Sori* submarginal, up to 12 per lobe, usually produced in upper half of lobe, 1–1,5 mm in diameter.

Eastern Cape Province, Transkei, Natal, Swaziland, Transvaal, Zimbabwe, Mozambique, Malawi and Tanzania. One of the most common epiphytic ferns in the more temperate areas of Southern Africa; it can also occur on lightly shaded mossy boulders in montane forest, 900–1 800 m. Map 134.

Vouchers: *Fisher* 840 (NH; NU; PRE); *Flanagan* 831 (GRA; PRE); *Marloth* 4926 (PRE; STE); *Schelpe* 6161 (BOL); *Schlechter* 4451 (BM; BOL; GRA; K; PRE).

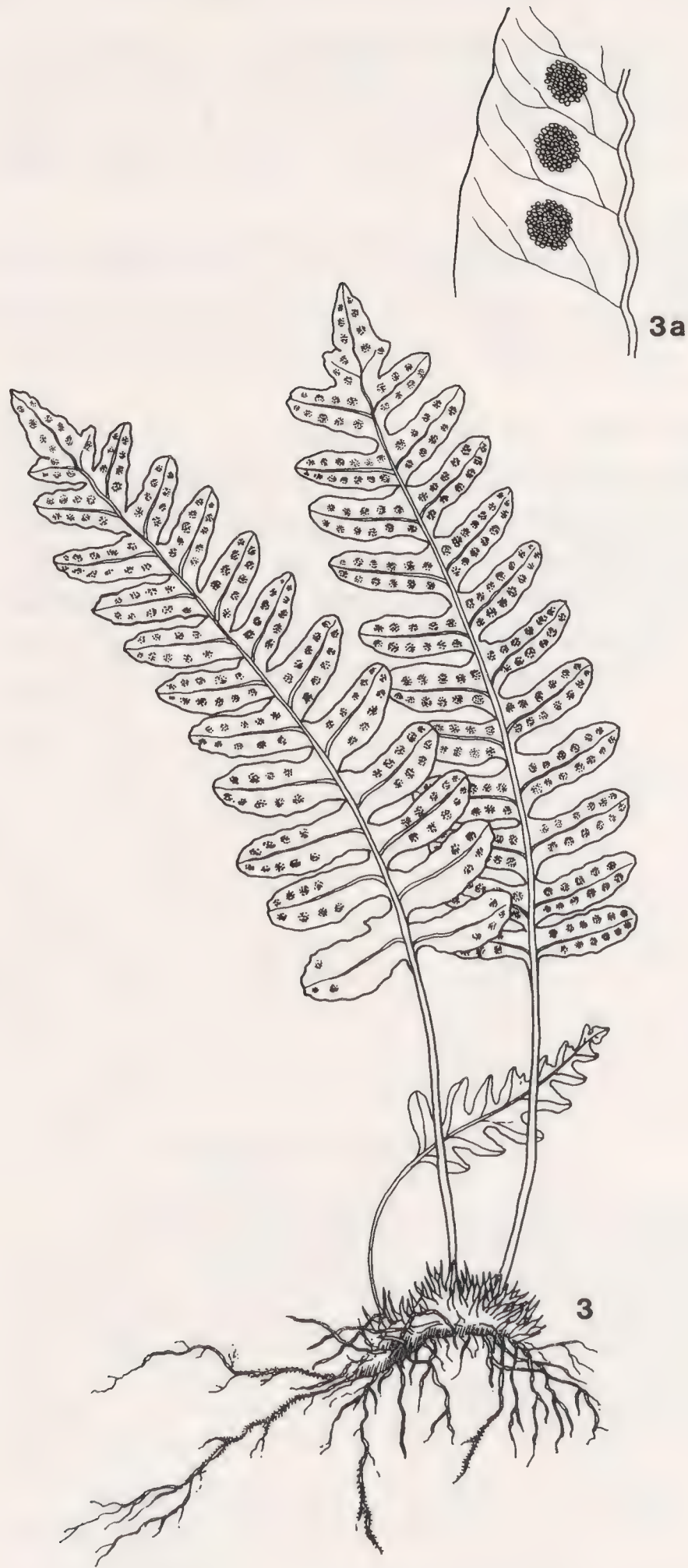
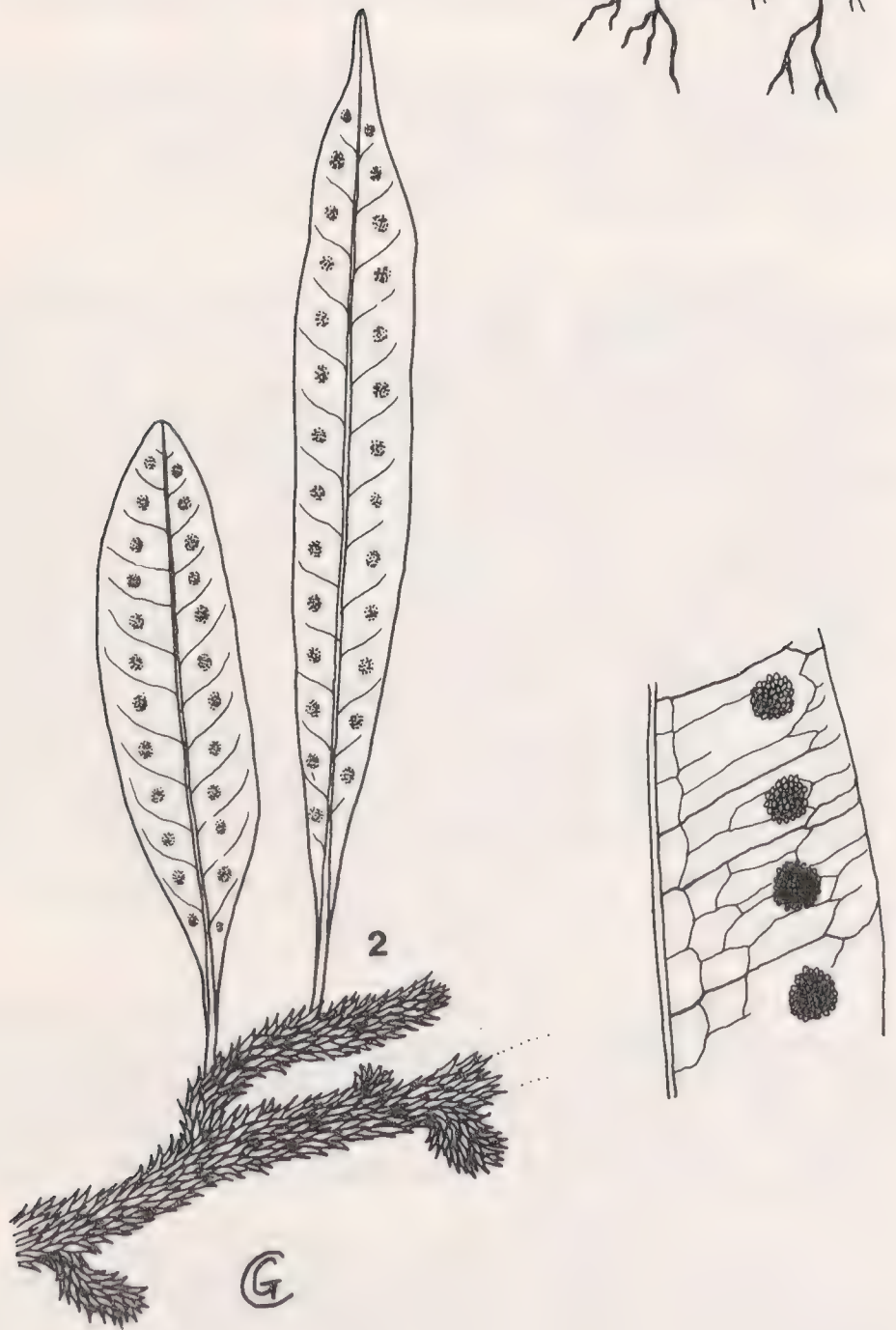
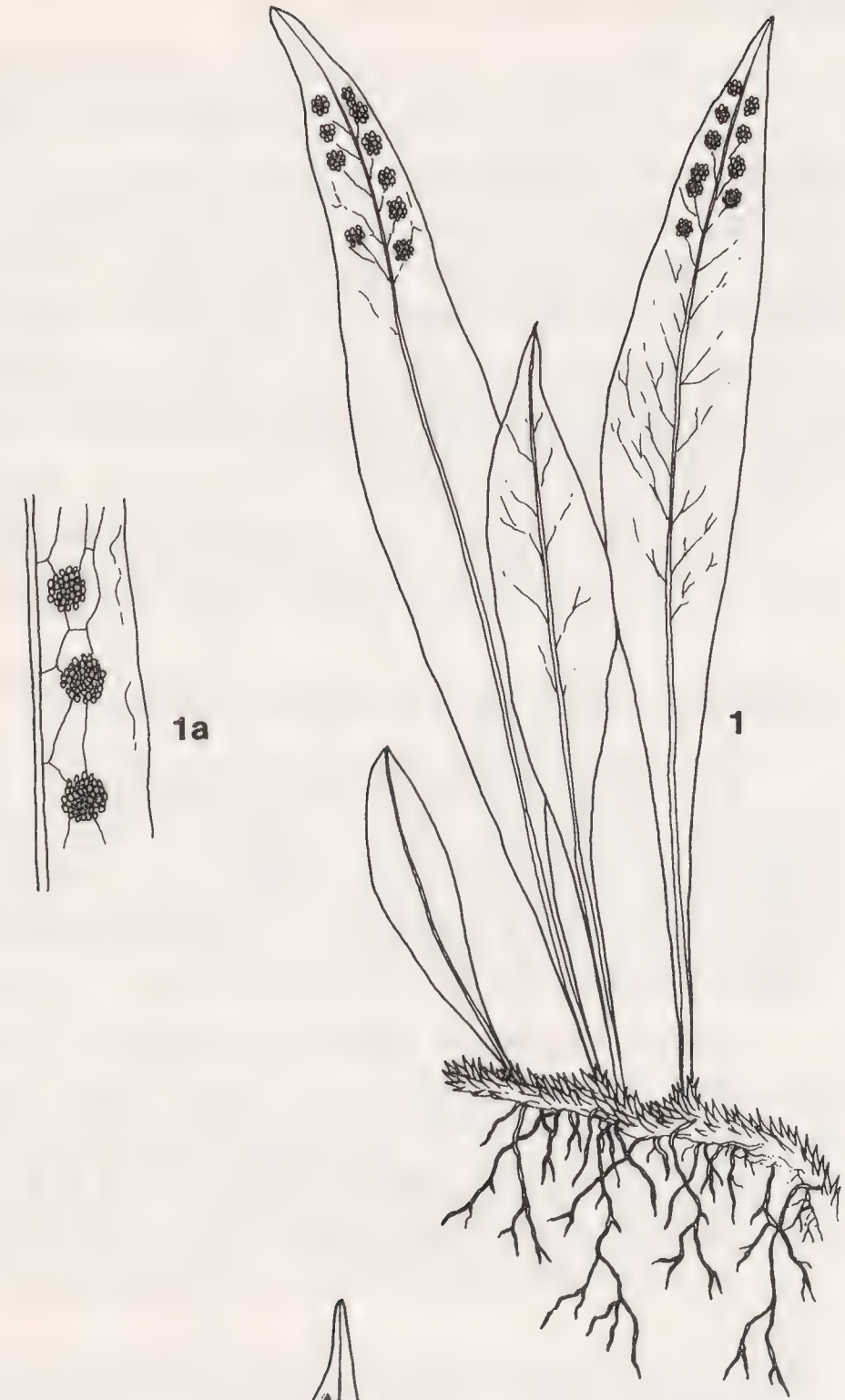


MAP 133.—*Polypodium vulgare*



MAP 134.—*Polypodium polypodioides* subsp. *ecklonii*







4. **×PLEOPODIUM**

**×Pleopodium** Schelpe & N. C. Anthony in Bothalia 15: 557 (1985). Type species: **×Pleopodium simianum** Schelpe & N. C. Anthony.

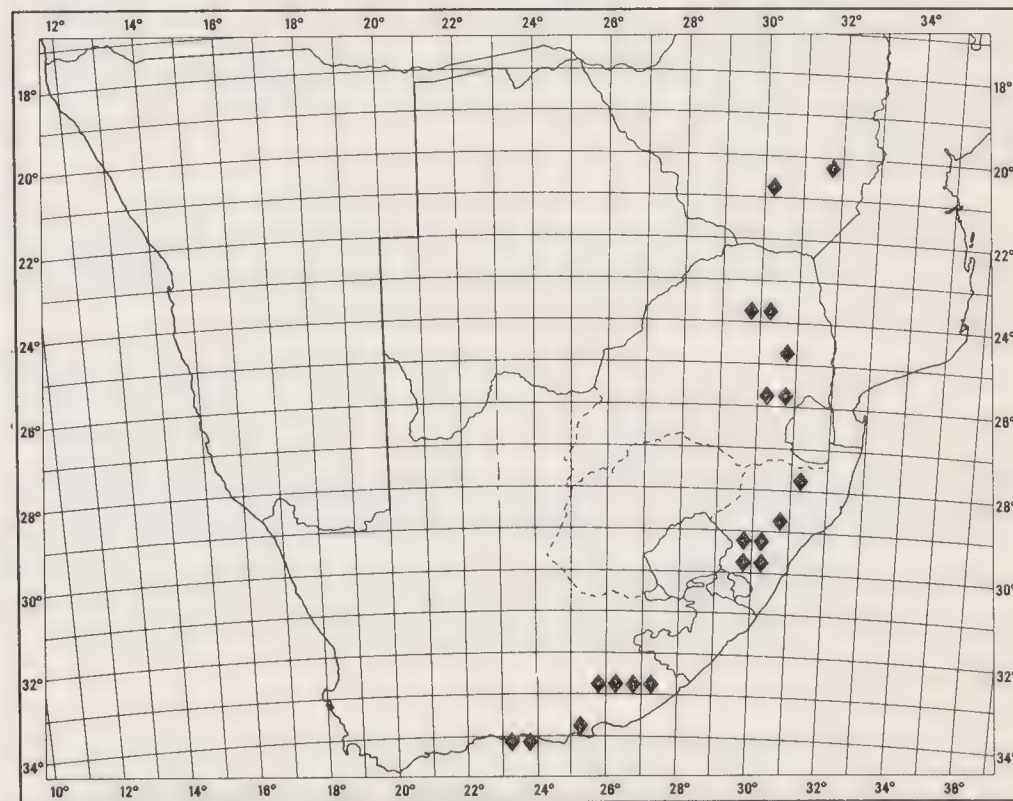
Rhizome creeping, set with clathrate-striped rhizome-scales. *Fron*ds spaced; *lamina* irregularly sinuate to pinnatifid, set with peltate scales below; *veins* anastomosing. *Sori* oval, without peltate paraphyses.

A putative intergeneric hybrid between *Polypodium* L. and *Pleopeltis* H.B.K. ex Willd. Its distribution range extends from the eastern Cape Province to Kenya.

**× Pleopodium simianum** Schelpe & N.C. Anthony in Bothalia 15: 557 (1985). Type: Natal, Lions River District, Everglades, Moll 1263 (BOL, holo.!: PRE).

*Polypodium lanceolatum* var. *sinuatum* Sim, Ferns S. Afr. edn 1: 202, t. 118 (1892); Ferns S. Afr. edn 2: 279, t. 143 (1915). *Pleopeltis macrocarpa* forma *sinuata* (Sim) Schelpe in Contr. Bolus Herb. 1: 96 (1969). Syntypes: Cape Province, Tsitsikamma, Atherstone (?K), Fordyce Tree, Holland (NBG!), Boschberg, MacOwan, above Perie Mission Station, above Evelyn Valley; Natal, Seven Mile Bush, Upper Umkomaas, on the heights near York, Buchanan.

Rhizome creeping, c. 2–3 mm in diameter, set with peltate, laciniate-lacerate, ovate-lanceolate, pale rhizome-scales c.  $3 \times 0,7$  mm with a central black clathrate stripe. *Fron*ds spaced 20–25 mm apart; *stipe* set with peltate rounded to ovate-lanceolate scales, becoming subglabrous with age; *lamina* thinly carnose-coriaceous, c.  $140 \times 20$  mm, lower half sinuate to deeply pinnatifid, irregular, segments unequally deltate, or elongate segments set at an angle to costa, upper half subentire to very shallowly sinuate around the sori, set with peltate, erose, dark-centred scales less than 1 mm long below, elongate towards costa; *veins* anastomosing in groups within segments or through-



MAP 135.—**× Pleopodium simianum**

out. *Sori* borne in two rows, one on either side of costa in upper half of *lamina*, oval, without paraphyses.

Epiphytic in forest and forest marginal scrub from Cape Province through Natal, Transvaal and Zimbabwe, c. 1 200 m in Southern Africa. Map 135.

Vouchers: Lawson 204 (NU); Moll 1240 (BOL; NU; PRE); Roux 514 (NBG); Schelpe 6039 (BOL); Schlechter 4452 (BOL).

5. **PLEOPELTIS**

**Pleopeltis** H.B.K. ex Willd. in L., Sp. Pl. 5: 211 (1810); Tardieu-Blot in Mém. Inst. fr. Afr. noire 28: 216 (1953); Alston in F.W.T.A. edn 2, Suppl. 49 (1959); Tardieu-Blot in Fl. Madag. 5, 2: 109 (1960); in Fl. Camer. 3: 345 (1964); Schelpe in F.Z. Pterid.: 151 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 67 (1973); in C.F.A. Pterid.: 118 (1977). Type species: *P. angusta* H.B.K.

Rhizome creeping, set with clathrate rhizome-scales. *Fron*ds closely or widely spaced, simple or entire, membranous or carnose-coriaceous, articulated to rhizome, with or without peltate scales; *veins* freely and irregularly anastomosing, with included veinlets. *Sori* round, protected when young with prominent peltate paraphyses.

FIG. 50.—1, *Pleopeltis schraderi*, part of plant,  $\times 0,6$ ; 1a detail of portion of fertile *lamina*,  $\times 1,8$  (Schelpe 7954). 2, *Microgramma lycopodioides*, part of plant,  $\times 0,6$ ; 2a, detail of portion of fertile *lamina*,  $\times 1,8$  (Schelpe 5204). 3, *Polypodium vulgare* subsp. *ecklonii*, plant,  $\times 0,6$ ; 3a, detail of portion of fertile *lamina*,  $\times 3,6$  (Blom 3/5).



A temperate and tropical genus of about 40 species.

1a Under surface of frond glabrous, or with a few scales along midrib:

2a Fronds membranous, deciduous; rhizome-scales concolorous ..... 3. *P. excavata*

2b Fronds carnose-coriaceous, persistent; rhizome-scales with a prominent black central stripe ..... 2. *P. schraderi*

1b Under surface of frond with numerous lacerate peltate scales ..... 1. *P. macrocarpa*

1. ***Pleopeltis macrocarpa*** (*Bory ex Willd.*) *Kaulf.* in Berl. Jb. Pharm. 21: 41 (1820); Schelpe in Contr. Bolus Herb. 1: 95 (1969); in F.Z. Pterid.: 152, t. 45B (1970); in C.F.A. Pterid.: 119 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 309, t. 225 (1983). Type: Réunion, *Bory* s.n., Herb. Willdenow no. 19629 (B, holo.!).

*Polypodium macrocarpum* Bory ex Willd. in L., Sp. Pl. edn 4, 5: 127 (1810). *Drynaria macrocarpa* (Bory ex Willd.) Fée, Mém. Fam. Foug. 5: 270 (1852).

*Polypodium lanceolatum* L., Sp. Pl. 2: 1082 (1753); Sim, Ferns S. Afr. edn 2: 278, t. 142 (1915), non *Pleopeltis lanceolata* Kaulf. (1824). Iconotype: Petiver, Pteridographia Americana t. 6 fig. 2 (1712)!, from San Domingo.

*Polypodium adpersum* Schrad. in Gött. Gel. Anz. 1818: 915 (1818). Type: Cape Province, *Hesse* s.n. (LE, holo.!--BOL, photo.!).

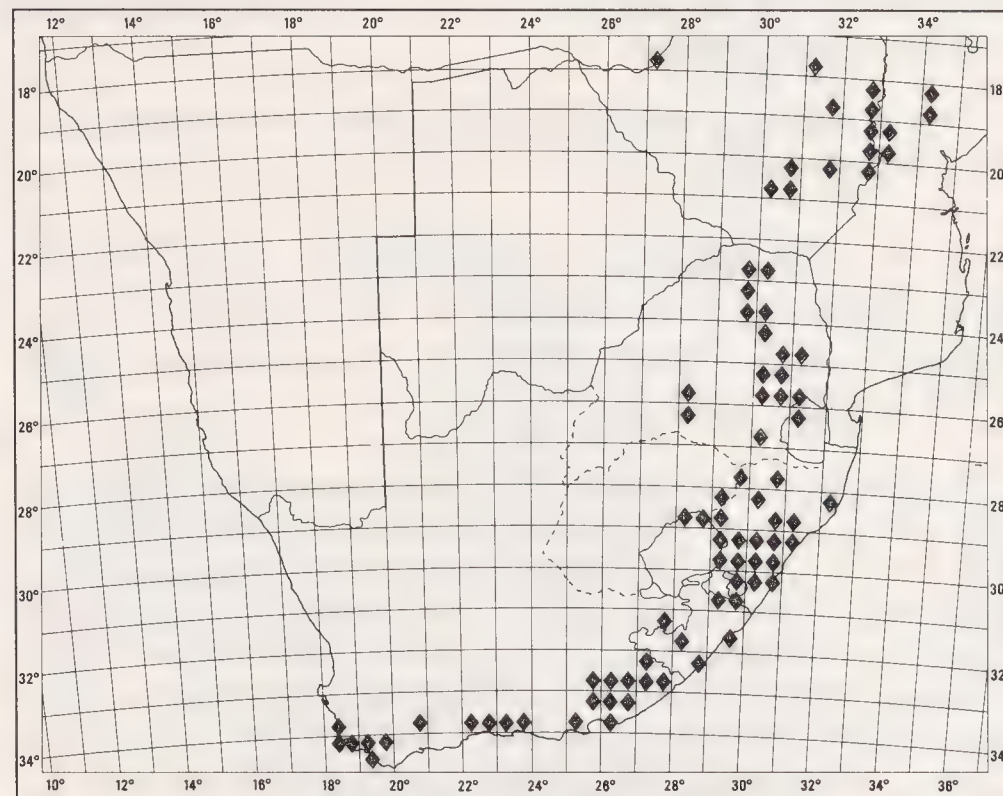
*Pleopeltis ensifolia* Carm. ex Hook., Exot. Fl. 1: t. 62 (1823). Type: Cape of Good Hope, *Carmichael* s.n. (K, holo.!).

*Polypodium lepidotum* Willd. ex Schlechtd., Adumbr. 17, t. 8 (1825). *Pleopeltis lepidota* (Willd. ex Schlechtd.) Presl, Tent. Pterid. 193 (1836), reimpr. in Abh. K. Böhm. Ges. Wiss., ser. 4, 5: 193 (1837). *Drynaria lepidota* (Willd. ex Schlechtd.) Fée, Mém. Fam. Foug. 5: 270 (1852). Type: Cape Peninsula, *Thouars* s.n., Herb. Willdenow no. 19612 (B, holo.!).

*Pleopeltis kaulfussiana* Presl, Tent. Pterid. 193 (1836), nom. illeg.

Rhizome widely creeping, c. 2 mm in diameter, set with lanceolate-acuminate, brown rhizome-scales c. 3 mm long with a dark central stripe and pale lacinate-lacerate margins. Fronds spaced up to 25 mm apart, coriaceous, stipitate; stipe grey brown at maturity, up to 80 mm long, set with occasional small pale, circular to lanceolate scales with dark centre; lamina narrowly elliptic, up to 200 × 17 mm, entire, upper surface glabrous, lower surface set with numerous pale, circular to lanceolate, minutely erose-lacerate scales less than 1 mm in diameter with dark centres. Sori oval, up to 4 mm in diameter, in a line on either side of midrib in upper half of lamina.

From south-western Cape Province and Transkei through Lesotho, Natal, Swaziland and Transvaal to the African tropics as far north as Cameroun and Ethiopia, as well as Fernando Po, St Helena, Madagascar and Réunion. Also recorded from tropical America, southern Chile, Juan



MAP 136.—*Pleopeltis macrocarpa*

Fernandez, Tristan da Cunha, India and Hawaii by Christensen (1906). One of the most common epiphytic and lithophytic ferns in the forests and forest marginal scrub in Southern Africa, 100–2 000 m and 2 400 m in tropical Africa. Map 136.

Vouchers: *Dieterlen* 812 (K; NH; PRE; SAM); *Flanagan* 832 (GRA; PRE; SAM); *Hutchinson* 15 (BOL; K; PRE); *Schlechter* 4452 (BOL; GRA; PRE); 6936 (BM; GRA; K; PRE; S; SAM).

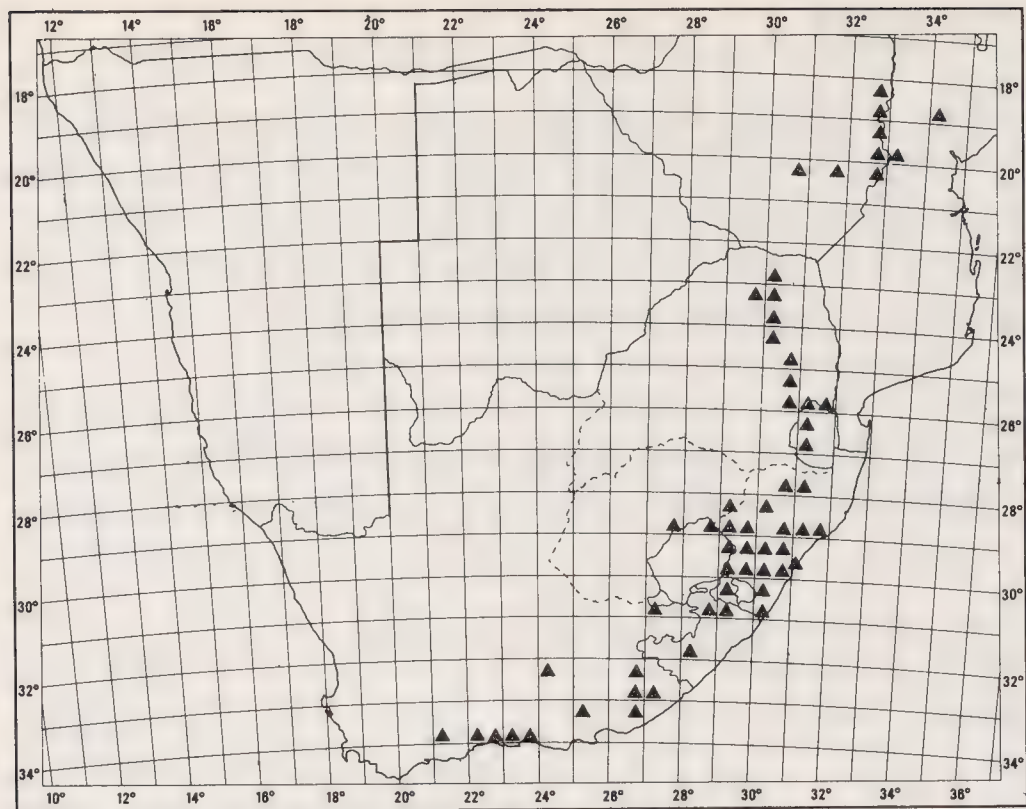
2. ***Pleopeltis schraderi*** (*Mett.*) *Tardieu-Blot* in Fl. Madag. 5, 2: 110 (1960); Schelpe in Contr. Bolus Herb. 1: 96 (1969); in F.Z. Pterid.: 152 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 308, t. 224 (1985). Type: Cape Province, ? near Grahamstown, *Hesse* s.n. (LE, holo.!).

*Polypodium schraderi* Mett. in Abh. senckenb. naturforsch. Ges. 2: 98, t. 2 fig. 11 (1856), reimpr. in Mett., Farngatt. 1: 98, t. 2 fig. 11 (1857). *Niphobolus schraderi* (Mett.) Keys., Polypod. Cyath. Herb. Bunge 39 (1873). *Lepisorus schraderi* (Mett.) Ching in Bull. Fan Memor. Inst. Biol., Bot. 4: 51 (1933). *Polypodium lineare* var. *schraderi* (Mett.) Sim, Ferns S. Afr. edn 2: 276, t. 140 (1915).

*Polypodium elongatum* Schrad. in Gött. Gel. Anz. 1818: 915 (1818). *Phymatodes elongata* (Schrad.) Pappe & Raws., Syn. Fil. Afr. Austr. 41 (1858), non Ait. (1789). Type: Cape Province, *Hesse* s.n. (LE, holo.--BOL, photo.!).

*Polypodium gueinzii* Mett. in Abh. senckenb. naturforsch. Ges. 2: 91, t. 3 figs 18, 19 (1856), reimpr. in Mett., Farngatt. 1: 91, t. 3 figs 18, 19 (1857), as *gueintzii*. *Lepisorus gueinzii* (Mett.) Ching in Bull. Fan Memor. Inst. Biol., Bot. 4: 51 (1933), as *gueintzii*. Type: Natal, *Gueinzii* s.n. (LZ, holo. †; S, ? iso.!).





MAP 137.—*Pleopeltis schraderi*

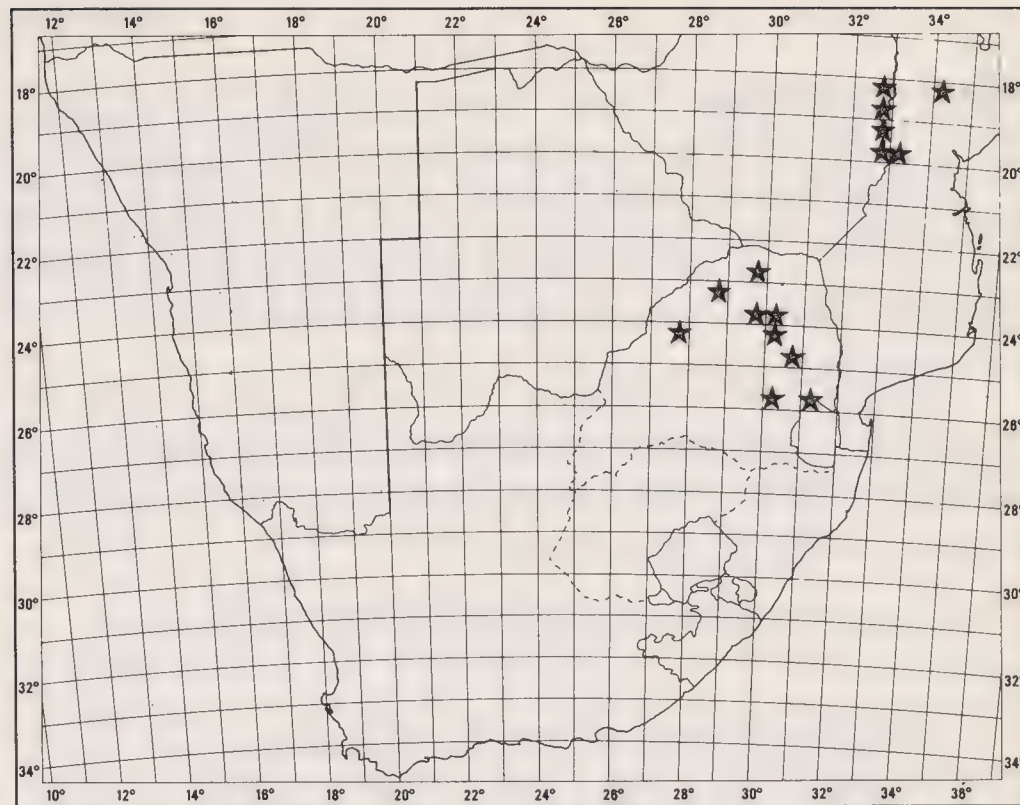
Rhizome c. 2 mm in diameter, set with broadly ovate-acuminate, black, clathrate rhizome-scales with a black central stripe extending to apex. *Fronds* spaced up to 10 mm apart, carnosely coriaceous, shortly stipitate; *stipe* stramineous, glabrous, up to 23 mm long; *lamina* very narrowly elliptic, acuminate, up to 330 × 23 mm, base very narrowly cuneate, glabrous on both surfaces at maturity. *Sori* round to oval, in a line on either side of midrib in upper half of lamina, up to 6 mm in diameter. Fig. 50: 1.

From southern Cape Province through Transkei, Natal, Swaziland and Transvaal, to Zimbabwe, Mozambique, Malawi, Tanzania, Kenya, Uganda, Madagascar and Mauritius. Usually a low-level epiphyte or growing on mossy boulders in shade in forest, but it may also occur in sheltered rock crevices or screes outside forest, from 260–2 300 m. Map 137.

Vouchers: *Schelpe* 6156 (BM; BOL); *Schlechter* 6914 (BM; GRA; K; PRE; SAM); *Sim* s.n. (GRA; PRE; SAM); *Strey* 8813 (BOL; NH).

**3. *Pleopeltis excavata* (Bory ex Willd.)**  
*Sledge* in Bull. Br. Mus. nat. Hist., Bot. 2, 5: 138 (1960); *Schelpe* in Contr. Bolus Herb. 1: 97 (1969); in F.Z. Pterid.: 151, t. 45C (1970); in C.F.A. Pterid.: 118 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 307, t. 223 (1983). Type: Mascarene Islands, *Bory* s.n., Herb. Willdenow no. 19619, sheet 2 (B, holo.!).

*Polypodium excavatum* Bory ex Willd. in L., Sp. Pl. edn 4, 5: 158 (1810). *Phymatodes excavata* (Bory ex Willd.) Presl, Tent. Pterid. 196 (1836), reimpr. in Abh. K. Böhm. Ges. Wiss., ser. 4, 5: 193 (1837). *Drynaria excavata* (Bory



MAP 138.—*Pleopeltis excavata*

ex Willd.) Fée, Mém. Fam. Foug. 5: 270 (1852). *Lepisorus excavatus* (Bory ex Willd.) Ching in Bull. Fan Memor. Inst. Biol., Bot. 4: 68 (1933). *Polypodium lineare* sensu Sim, Ferns S.Afr. edn 2: 275, t. 139 (1915).

Rhizome with a white waxy covering and set with brown, clathrate, lanceolate to narrowly ovate-acuminate rhizome-scales up to 4 mm long with a paler subentire to weakly lacerate margin. *Fronds* spaced 4–12 mm apart, simple, membranous, deciduous, shortly to longly stipitate; *stipe* stramineous, up to 70 mm long, with a few scales when young; *lamina* narrowly lanceolate to linear, up to 330 × 27 mm, entire to weakly undulate, acuminate to obtuse, base widely to narrowly cuneate, completely glabrous or with a few scales along midrib when young. *Sori* in a line on either side of midrib in upper two-thirds of lamina, up to 4 mm in diameter at maturity.

Transvaal, Mozambique, Zimbabwe, Angola, Malawi, Zambia, Zaire, Tanzania, Kenya, Uganda, Ethiopia, Sudan, Cameroun, Nigeria, Liberia, Sierra Leone; Fernando Po, Madagascar, Mauritius, Réunion, Comoro Islands. A low- to mid-level epiphyte in forest or on sheltered mossy boulders, from 1 500–1 800 m in Transvaal and 2 500 m in Zimbabwe. Map 138.

Vouchers: *Burtt-Davy* 1241 (GRA; PRE); *Schweickhardt* 2440 (BOL; PRU).

Deciduous during the dry winters of its habitat, but even at that season the dormant rhizomes are readily discernable by the white waxy covering under the rhizome-scales.



## 6. MICROGRAMMA

**Microgramma** Presl, Tent. Pterid. 213 (1836), reimpr. in Abh. K. Böhm. Ges. Wiss., ser. 4, 5: 213, t. 9 (1837); Tardieu-Blot in Mém. Inst. fr. Afr. noire 28: 220 (1953); Alston in F.W.T.A. edn 2, Suppl. 49 (1959); Tardieu-Blot in Fl. Madag. 5, 2: 108 (1960); in Fl. Gabon 8: 206 (1964); in Fl. Camer. 3: 348 (1964); Schelpe in F.Z. Pterid.: 155 (1970); in C.F.A. Pterid.: 120 (1977). Type species: *M. persicariaefolia* (Schrad.) Presl (= *Polypodium persicariaefolium* Schrad.).

Rhizome creeping, set with lanceolate to subulate rhizome-scales. *Fronds* widely spaced, simple, sometimes somewhat dimorphous with fertile fronds longer and narrower than sterile fronds, entire, articulate; *venation* reticulate, with included veinlets only in costal areoles. *Sori* round, without paraphyses.

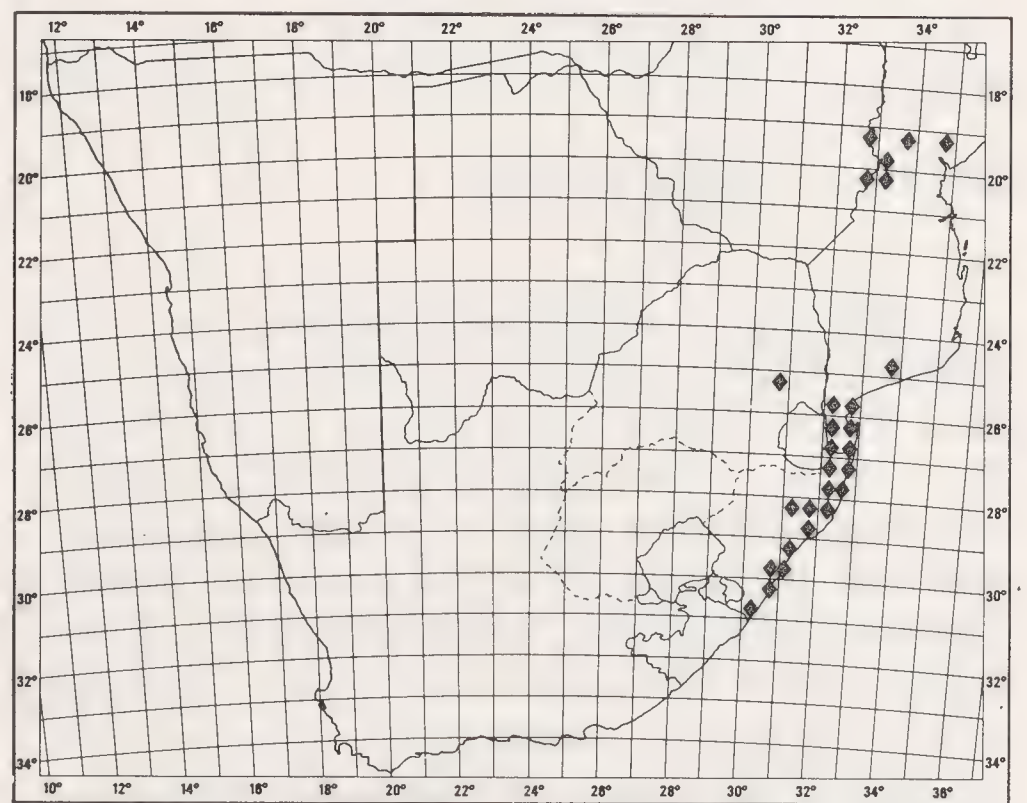
A genus of about 15 species mainly in the American tropics, but with one variable species in Africa.

**Microgramma lycopodioides** (L.) Copel., Gen. Fil. 185 (1947); Schelpe in Contr. Bolus Herb. 1: 100 (1969); in F.Z. Pterid.: 155, t. 48C (1970); in C.F.A. Pterid.: 120, t. 20B (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 311, t. 226 (1983). Type: Central America (LINN 1251/2, holo.).

*Polypodium lycopodioides* L., Sp. Pl. 2: 1082 (1753); Sim, Ferns S. Afr. edn 2: 279, t. 144 fig. 1 (1915).

*Polypodium mackenii* Bak., Syn. Fil. 357 (1868). *Polypodium lycopodioides* var. *mackenii* (Bak.) Sim, Ferns S. Afr. edn 1: 203 (1892); Ferns S. Afr. edn 2: 280, t. 144 fig. 2 (1915). Type: Natal, *McKen* s.n. (K, holo.).

Rhizome widely creeping, up to 5 mm in diameter, set with subulate, entire, pale brown rhizome-scales up to 6 mm long turning grey with age. *Fronds* spaced 10 mm or more apart, stipitate, sometimes somewhat dimorphous with fertile fronds longer and narrower than sterile fronds; *stipe* up to 15 mm long; *lamina* narrowly oblong to elliptic, acute, obtuse or caudate, up to 150 × 22 mm, decurrent basally; *midrib* pale, prominent below; *venation* mostly obscure. *Sori* in a line on either side of midrib about halfway between midrib and margin, 2–2.5 mm in diameter. Fig. 50: 2.



MAP 139.—*Microgramma lycopodioides*

Natal, Swaziland, Transvaal, Mozambique, Zimbabwe, Angola, Zaire, Uganda, Tanzania, Cameroun, Nigeria, Ghana, Ivory Coast, Liberia, Guinea, São Tomé, Príncipe, Annobon, Zanzibar, Mauritius and tropical America. Sporadic in moist scrub and short forest patches along the coastal belt of eastern South Africa below 170 m and northwards on the coastal plain of Mozambique below 950 m. It is usually found climbing up shrubs and produces fertile fronds when the plant grows through into higher light intensities. Map 139.

Vouchers: *Schelpe* 5204 (B; BM; BOL; GH; K; M; MO; P; PRE; S; US); *Strey* 8098 (BOL; NH); 8234 (BOL; NH); *Wager* 197 (PRE).

## 7. MICROSORIUM

**Microsorium** Link, Hort. Berol. 2: 110 (1833); Tardieu-Blot in Mém. Inst. fr. Afr. noire 28: 221 (1953); Alston in F.W.T.A. edn 2, Suppl. 49 (1959); Tardieu-Blot in Fl. Madag. 5, 2: 114 (1960); in Fl. Gabon 8: 208 (1964); in Fl. Camer. 3: 350 (1964); Schelpe in F.Z. Pterid.: 156 (1970); in C.F.A. Pterid.: 121 (1977). Type species: *M. irregulare* Link.

Rhizome creeping, epiphytic, lithophytic or terrestrial, set with dark, lanceolate rhizome-scales. *Fronds* tufted or spaced, subsessile to stipitate, articulated; *lamina* simple to deeply pinnatifid, glabrous, entire (or rarely minutely notched); *venation* reticulate with numerous areoles with included veinlets (sometimes ending in hydathodes). *Sori* circular, with or without non-peltate paraphyses.



A genus of about 60 species mainly in the tropics of Asia.

1a Mature fronds simple; sori scattered over part or all of under surface of lamina:

2a Sori scattered over whole under surface of lamina, c. 1 mm in diameter ..... 1. *M. punctatum*

2b Sori scattered between midrib and halfway to margin, c. 5 mm in diameter ..... 2. *M. pappei*

1b Mature fronds deeply pinnatifid; sori set in one or two rows on either side of costae:

3a Sori in single rows; margin shallowly crenate ..... 3. *M. ensiforme*

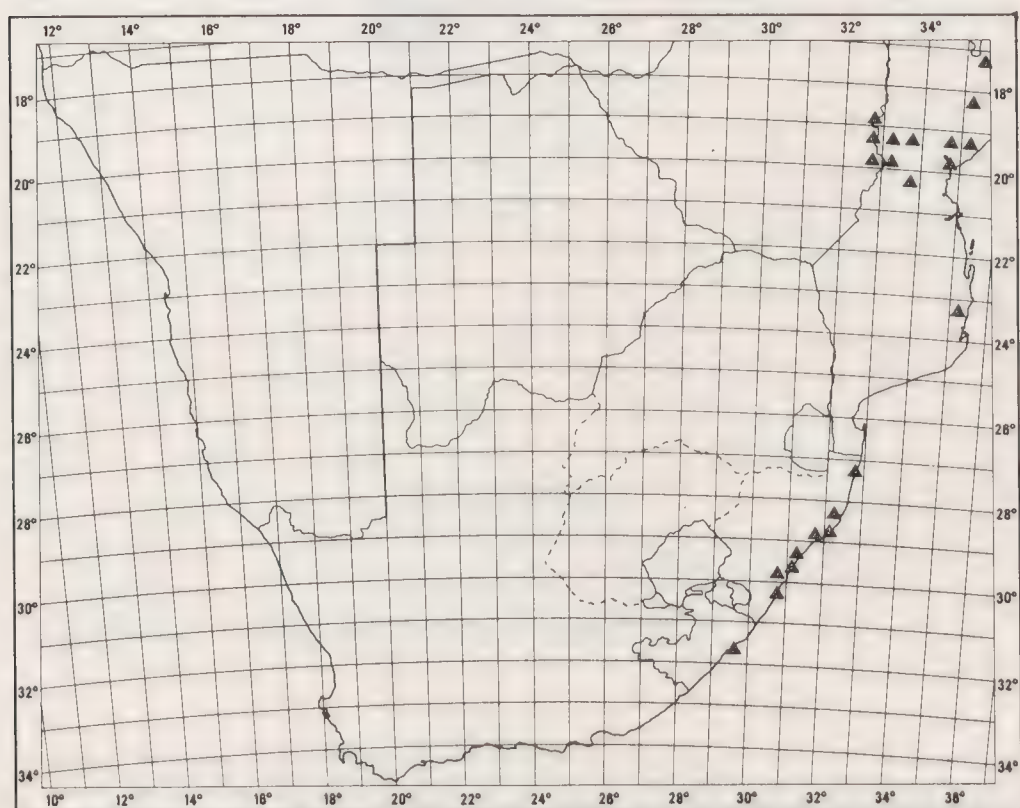
3b Sori in double rows (rarely single); margin entire ..... 4. *M. scolopendrium*

1. ***Microsorium punctatum* (L.) Copel.** in Univ. Calif. Publ. Bot. 16: 111 (1929); Schelpe in Contr. Bolus Herb. 1: 102 (1969); in F.Z. Pterid.: 156, t. 48A (1970); in C.F.A. Pterid.: 121 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 312, t. 48, 227 (1983). Type: China, *Fothergill* s.n. (Lost).

*Acrostichum punctatum* L., Sp. Pl. edn 2, 2: 1524 (1763). *Polypodium punctatum* (L.) Swartz in J. Bot., Gött. 1800, 2: 21 (1801), non Thunb. (1784); Sim, Ferns S. Afr. edn 2: 282, t. 145 fig. 2 (1915). *Pleopeltis punctata* (L.) Bedd., Ferns Brit. Ind. 22 (1876).

Rhizome c. 8 mm in diameter, embedded in a thick felt of roots and set with dark grey, entire, lanceolate-acuminate rhizome-scales c. 3 mm long. *Fronds* spaced c. 10 mm apart, simple, subsessile, thinly to thickly carnose-coriaceous; *lamina* elliptic to narrowly elliptic, up to 1 × 0.09 m, entire to irregularly undulate, rounded, acute to acuminate; *venation* rather obscure, midrib prominent below. *Sori* numerous, minute, scattered over under surface of lamina, c. 1 mm in diameter.

Transkei and Natal, Mozambique, Zimbabwe, Malawi, Angola, Zaire, Tanzania, Uganda, Equatorial Guinea, Cameroun, Nigeria, Ghana, Liberia, Sierra Leone, Annobon, Principé, São Tomé, Comoro Islands, Madagascar, Zanzibar, Mauritius, Seychelles and Réunion. Sporadic lithophyte on shaded rock outcrops along the coasts of Natal and Transkei; also widespread in tropical Africa where it may occur as an epiphyte, 1 000–2 000 m. Map 140.



MAP 140.—*Microsorium punctatum*

Vouchers: *Schelpe* 5032 (B; BM; BOL; GH; K; M; MO; P; PRE; S; US); *Schlechter* 3161 (GRA; K; PRE); *Taylor* 2641 (BOL; NBG).

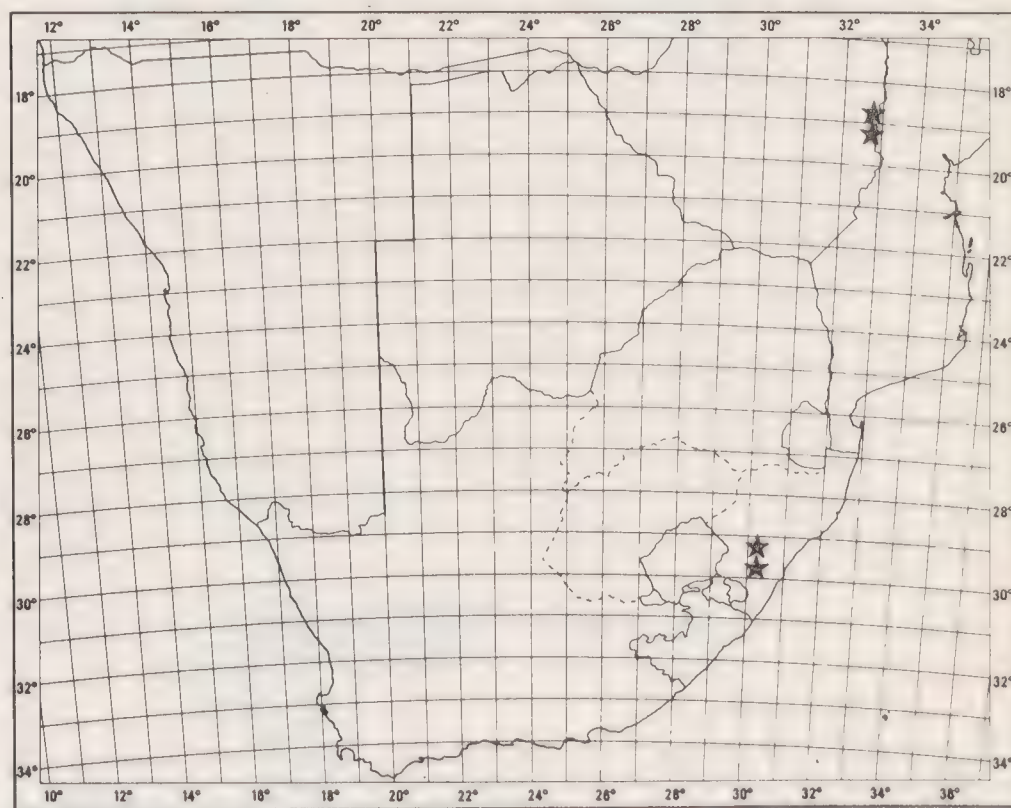
2. ***Microsorium pappei* (Mett. ex Kuhn)** *Tardieu-Blot* in Fl. Madag. 5, 2: 115 (1960); Schelpe in Contr. Bolus Herb. 1: 103 (1969); in F.Z. Pterid.: 158, t. 48B (1970); W.B.G. Jacobsen, Ferns Sthn Afr. 313, t. 228a & b (1983). Syntypes: South Africa, Kaffraria, *Rawson* s.n. (BM, ? iso.); Natal, *Sanderson* s.n. (K, ? iso.).

*Polypodium pappei* Mett. ex Kuhn, Fil. Afr. 150 (1868); Sim, Ferns S. Afr. edn 2: 277, t. 141 fig. 1 (1915).

Rhizome up to 3 mm in diameter, set with dark brown, ovate-lanceolate, acuminate, entire rhizome-scales c. 35 mm long. *Fronds* spaced c. 30 mm apart, simple, stipitate, firmly membranous; *stipe* pale green, up to 120 mm long, glabrous except for a few dark brown scales basally; *lamina* elliptic, up to 370 × 80 mm, entire to weakly undulate, acuminate, decurrent basally, midrib pale, prominent below; *venation* obscure. *Sori* borne between the midrib and halfway to the margin, c. 5 (–25) mm in diameter. Fig. 51: 1.

Natal, Zimbabwe, Mozambique, Tanzania and Madagascar. Lithophytic in deep shade in forest, c. 1 500 m, rare. Map 141.

Vouchers: *Hill* 160 (PRE); *Johnstone* 162 (BM; NU).



MAP 141.—*Microsorium pappei*







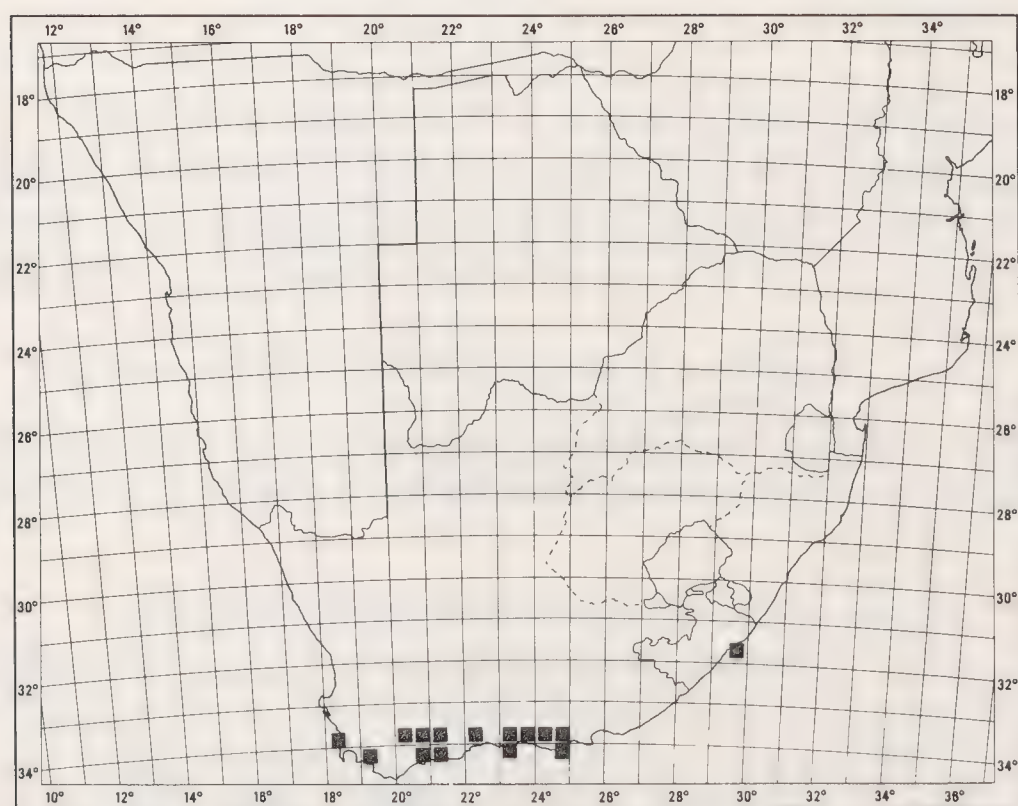
3. **Microsorium ensiforme** (Thunb.) Schelpe in Contr. Bolus Herb. 10: 151 (1982). Type: Cape Province, Grootvadersbosch, Thunberg s.n. (UPS, holo.).

*Polypodium ensiforme* Thunb., Prodr. 172 (1800); Sim, Ferns S. Afr. edn 2: 272, t. 137 (1915). *Marginaria ensiformis* (Thunb.) Presl, Tent. Pterid. 188 (1836). *Phlebodium ensiforme* (Thunb.) J. Sm. in Hook., J. Bot. 4: 59 (1841). *Gonophlebium ensiforme* (Thunb.) Fée, Mém. Fam. Foug. 5: 255 (1852). *Phymatodes ensiformis* (Thunb.) Schelpe in Jl S. Afr. Bot. 35: 135 (1969); W. B. G. Jacobsen, Ferns Sthn Afr. 316, t. 230 (1983).

Rhizome c. 5 mm in diameter, set with linear-lanceolate, fimbriate, clathrate, black to dark brown rhizome-scales c. 3 mm long with a paler margin. *Fronds* spaced 5–30 mm apart, erect, coriaceous; *stipe* pale brown, up to 150 mm long; *lamina* oblong to broadly lanceolate, coriaceous, glabrous, rarely simple, deeply pinnatifid almost to midrib into linear, weakly undulate and shallowly crenate lobes up to  $140 \times 10$  mm, acute to rounded apically and with decurrent bases; *midrib* prominent below. *Sori* round, up to 2 mm in diameter, set in a line on either side of costa and sunken into lamina. Fig. 51: 2.

Endemic to southern Cape Province and Transkei. Not uncommon in the undergrowth of forests of the coastal belt, but occasionally a lithophyte on shaded humus-covered boulders in forest, and less frequently a low-level epiphyte, 100–1 300 m. Map 142.

Vouchers: Duthie s.n. (STE); Macpherson s.n. (NBG 10786); Muir 845 (BOL; PRE); Schelpe 4283 (B; BOL; GH; K; M; MO; P; PRE; S; US).



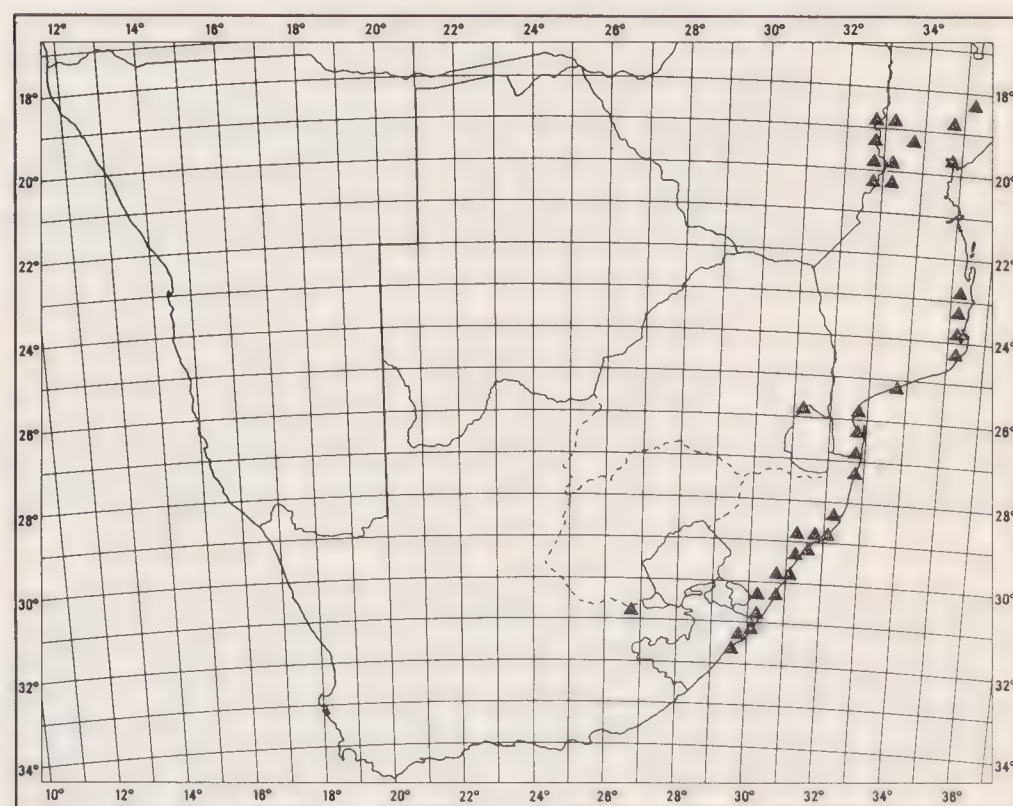
MAP 142.—*Microsorium ensiforme*

4. **Microsorium scolopendrium** (Burm. f.) Copel. in Univ. Calif. Publ. Bot. 16: 112 (1929); Schelpe in C.F.A. Pterid.: 122, t. 21 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 314, t. 70, 229 (1983). Type: India, Herb. Burmann (G, holo.).

*Polypodium scolopendrium* Burm. f., Fl. Ind. 232 (1768). *Phymatodes scolopendria* (Burm. f.) Ching in Contr. Inst. Bot. Nat. Acad. Peiping 2: 63 (1933).

*Polypodium phymatodes* L., Mant. Alt. 306 (1771); Sim, Ferns S. Afr. edn 2: 273, t. 138 (1915). *Chrysopteris phymatodes* (L.) Fée, Mém. Fam. Foug. 5: 270 (1852). *Pleopeltis phymatodes* (L.) T. Moore, Ind. Fil. 78 (1857). *Phymatodes phymatodes* (L.) Maxon in Contr. U.S. Nat. Mus. 9: 352, t. 62 (1905). Type: India (LINN 1251/6, holo.).

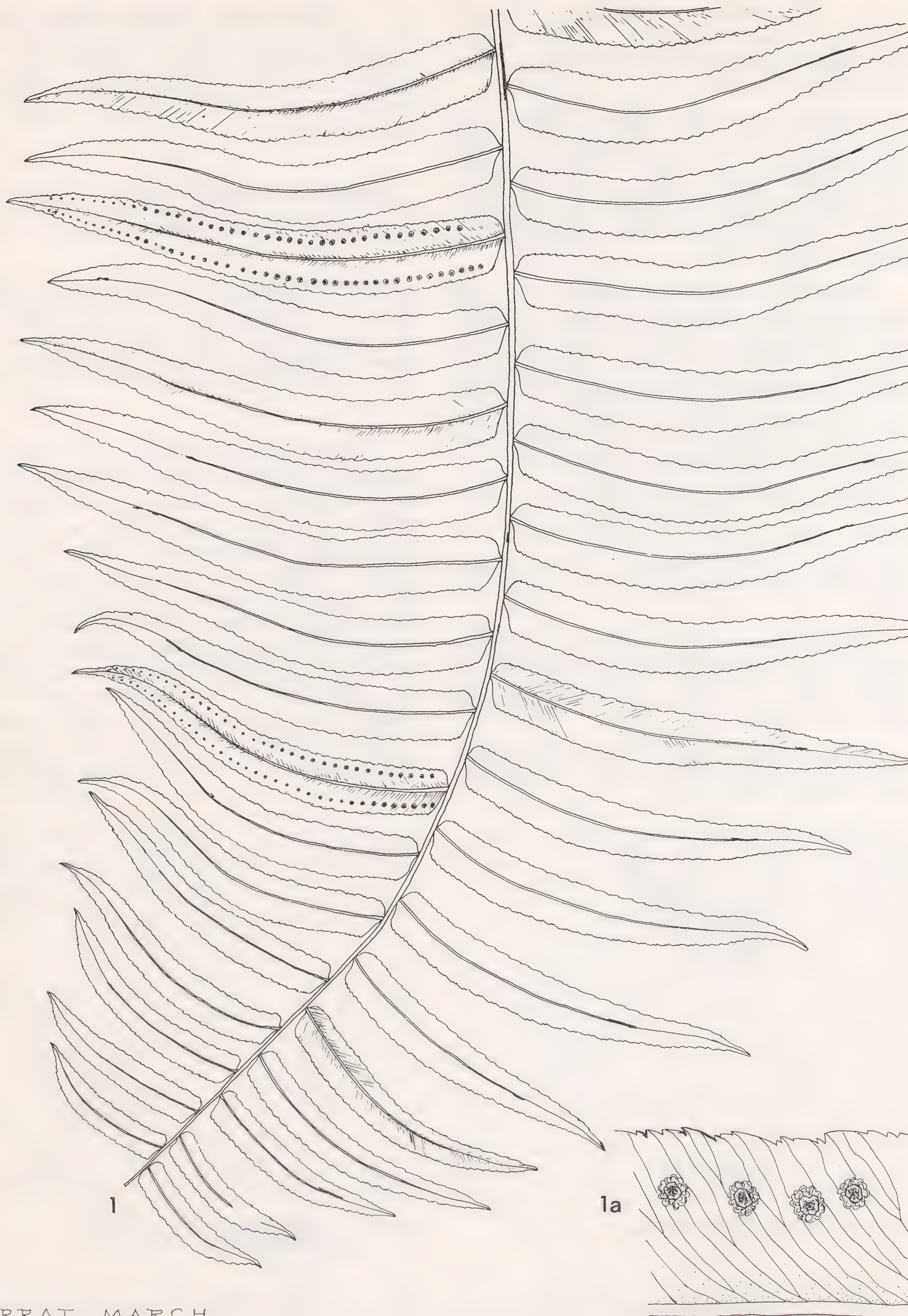
Rhizome widely creeping, up to 10 mm in diameter, set with narrowly lanceolate, acuminate, pseudoserrate, often squarrose rhizome-scales up to 4 mm long, which are caducous leaving older rhizomes with a white, ceraceous surface. *Fronds* widely spaced, deeply pinnatifid, coriaceous, stipitate; *stipe* pale yellowish green to grey (brown when dry), up to 0,4 m long; *lamina* broadly oblong, glabrous, deeply pinnatifid into narrowly oblong, acute to acuminate lobes up to  $150 \times 30$  mm; *midrib* prominent below. *Sori* round or oval, in one or usually two rows on either side of costa, somewhat sunken into lamina, 2–3 mm in diameter at maturity.



MAP 143.—*Microsorium scolopendrium*

FIG. 51.—1, *Microsorium pappei*, part of plant,  $\times 0,6$ ; 1a, portion of fertile lamina,  $\times 1,8$  (Buchanan 23589). 2, *Microsorium ensiforme*, part of plant,  $\times 0,6$ ; 2a, detail of portion of fertile lamina,  $\times 1,8$  (Esterhuysen 6618).







Transkei, Natal, Transvaal, Zimbabwe, Mozambique, Angola, Zaire, Uganda, Tanzania, Ethiopia, Sudan, Equatorial Guinea, Cameroun, Nigeria, Benin, Ghana, Ivory Coast, Sierra Leone, Liberia; Fernando Po, São Tomé, Príncipe, Madagascar, Comoro Islands, Mauritius, Réunion, Rodrigues, Seychelles and tropical Asia. Common in the undergrowth of coastal bush from Natal northwards, and occasionally found in riverine forest up to 1 000 m altitude. Map 143.

Vouchers: *Brueckner & Allsopp* 299 (BM; NU); *Taylor* 2593 (BOL; NBG); *Thorncroft* 99 (PRE); *Whellan* 1108 (BOL; SRGH).

*Microsorium scandens* (G. Forst.) Tindale is an introduced alien from New Zealand growing at the Kirstenbosch National Botanic Garden on *Cyathea dregei*.

Similarly *Phlebodium aureum* J. Sm., a commonly cultivated South American fern with large pinnatifid fronds, has escaped from cultivation in the vicinity of Durban. It can be distinguished from *Microsorium scolopendrium* by the venation (fewer included veinlets), the very dense tomentum of reddish rhizome-scales clothing the rhizome, the close spacing of the pinnatifid segments and by the fact that the sori are not sunken into the lamina.

## DAVALLIACEAE

Terrestrial, lithophytic or epiphytic plants. *Rhizome* erect or creeping, some producing perennating tubers (*Nephrolepis*), and with peltate rhizome-scales. *Fronds* tufted or spaced; *stipe* with several vascular strands, articulated or not; *lamina* simple, pinnate or much-dissected, pinnae articulated or not. *Sori* superficial or terminal on veins; *indusium* usually opening towards margin. *Spores* monolete, without perispore.

- 1a Fronds pinnate to 2-pinnatifid; pinnae articulated to rhachis:
  - 2a Stipes not articulated; frond-bearing rhizome erect; plants often with tubers..... 1. *Nephrolepis*
  - 2b Stipes articulated; frond-bearing rhizome creeping; plants never with tubers ..... 2. *Arthropteris*
- 1b Fronds simple, or pinnae not articulated to rhachis:
  - 3a Fronds simple; sori superficial on veins ..... 3. *Oleandra*
  - 3b Fronds much-dissected; sori terminal on veins ..... 4. *Davallia*

## 1. NEPHROLEPIS

*Nephrolepis* Schott, Gen. Fil. 1, t. 3 (1834); Engl., Pflanzenw. Afr. 2: 18 (1908); Tardieu-Blot in Mém. Inst. fr. Afr. noire 28: 153 (1953); in Fl. Madag. 5, 1: 59 (1958); Alston in F.W.T.A. edn 2, Suppl. 50 (1959); Tardieu-Blot in Fl. Gabon 8: 85 (1964); in Fl. Camer. 3: 108 (1964); Schelpe in F.Z. Pterid.: 159 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 68 (1873); in C.F.A. Pterid.: 124 (1977). Lectotype species: *N. exaltata* (L.) Schott (= *Polypodium exaltatum* L.).

Rhizome short, erect, sometimes stoloniferous and tuber-forming, set with brown rhizome-scales. *Fronds* tufted, pinnate; *stipe* not articulated; *pinnae* articulated to rhachis, hairy to subglabrous; *veins* free. *Sori* terminal on veins, circular and intramarginal to elongate-submarginal, with reniform to elongate indusia.

A genus of about 35 species, mostly pantropical.

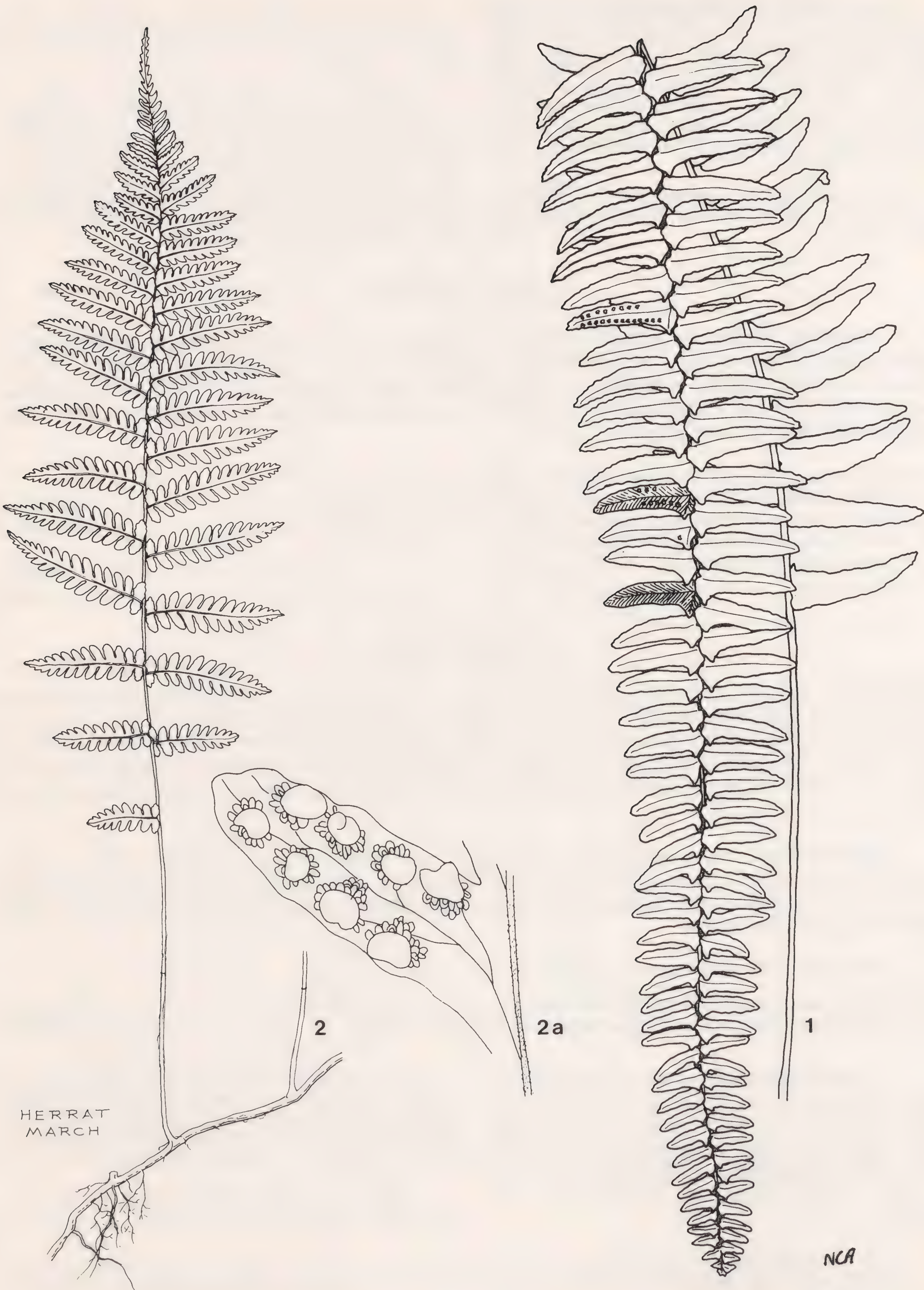
- Sori opening towards pinna margin; pinnae not markedly auriculate; plants not tuberous ..... 1. *N. biserrata*
- Sori opening towards pinna apex; pinnae markedly auriculate; plants tuberous ..... 2. *N. exaltata*

1. *Nephrolepis biserrata* (Swartz) Schott, Gen. Fil. sub. t. 3 (1834); Sim, Ferns S. Afr. edn 2: 123, t. 35 (1915); Schelpe in F.Z. Pterid.: 160 (1970); in C.F.A. Pterid.: 125 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 321, t. 234 (1983). Type: Mauritius, *Gröndal* s.n. (S, holo.).

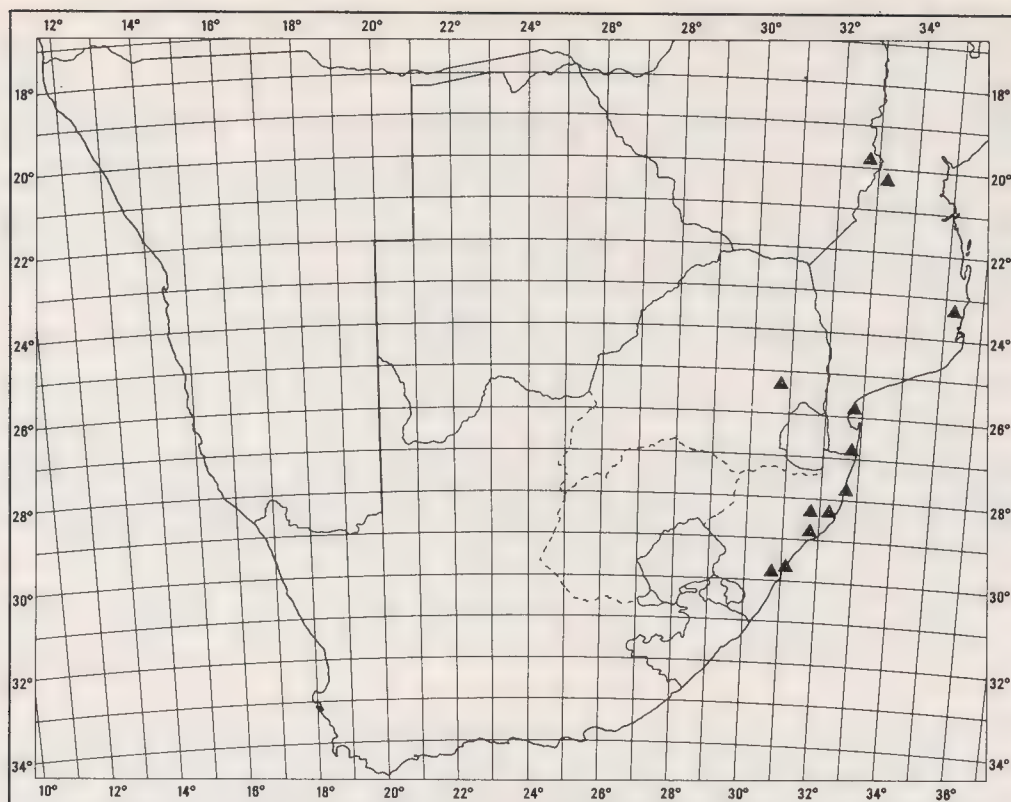
*Aspidium biserratum* Swartz in J. Bot., Gött. 1800, 2: 32 (1801). *Nephrodium biserratum* (Swartz) Presl, Reliq. Haenk. 1: 31 (1825). *Hypopeltis biserrata* (Swartz) Bory in Bélanger, Voy. Ind. Or., Bot. 2: 65 (1833). *Lepidoneuron biserratum* (Swartz) Fée, Mém. Fam. Foug. 5: 301 (1852).

Rhizome erect. *Fronds* suberect to arching; *stipe* pale brown, up to 220 mm long, set









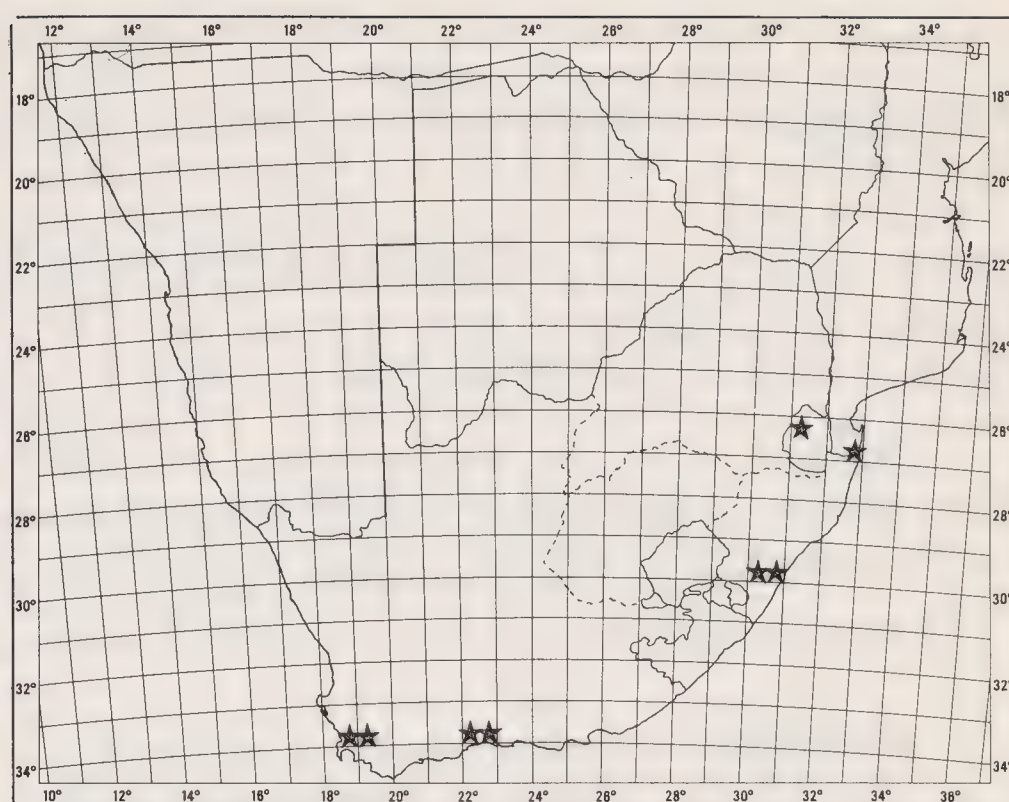
MAP 144.—*Nephrolepis biserrata*

with pale brown, narrowly lanceolate scales up to 2 mm long, becoming subglabrous with age; *lamina* narrowly elliptic, c. 600 × 240 mm, acute, pinnate, lower pinnae only slightly reduced; *pinnae* shortly petiolate, up to 36 pairs, very narrowly oblong, attenuate, crenate, base broadly cuneate, thinly pilose with minute white hairs when young, becoming subglabrous, submarginal hydathodes present but not conspicuous; *rhachis* pale brown, thinly pilose and set with scattered scales. *Sori* c. 4 mm apart in a line 2/3 the distance from costa to margin, c. 1 mm in diameter, opening outwards at right angles to veins; *indusium* membranous, entire, c. 0,6 mm in diameter. Fig. 52.

Pantropical. Natal, Transvaal, Zimbabwe, Mozambique, Angola, Zambia, Zaire, Tanzania, Kenya, Uganda, Sudan, Central African Republic, Gabon, Cameroun, Nigeria, Ghana, Liberia, Sierra Leone, São Tomé, Príncipe, Annobon, Zanzibar, Pemba, Madagascar, Comoro Islands, Mauritius, Réunion and Seychelles. Terrestrial, in wet shaded localities in forest, 10–1 300 m. Map 144.

Vouchers: *Burrows* 1392 (BOL; NBG); *Schelpé* 5196 (BOL); 5228 (BOL); *Sim* s.n. (PRE); *Ward* 3395 (NPB; NU).

2. *Nephrolepis exaltata* (L.) Schott, Gen. Fil. sub. t. 3 (1834); *Sim*, Ferns S. Afr. edn 2: 125, t. 61 fig. 1 (1915). Type: Jamaica, *Harlow* sub *Sloane* fol. 1, 52 (BM, holo.—BOL, photo.).



MAP 145.—*Nephrolepis exaltata*

*Polypodium exaltatum* L., Syst. Nat. edn 10, 2: 1309 (1759). *Aspidium exaltatum* (L.) Swartz in J. Bot., Gött. 1800, 2: 32 (1801). *Nephrodium exaltatum* (L.) R. Br., Prodr. Fl. Nov. Holl. 148 (1810).

Rhizome erect, stoloniferous and tuber-forming. *Fronds* tufted, erect, firmly herbaceous; *stipe* brown when dry, shorter than *lamina*, set with light brown, narrowly lanceolate-attenuate scales c. 5 mm long with occasional minute marginal outgrowths, becoming subglabrous with age; *lamina* narrowly ovate-lanceolate, c. 420 × 45 mm, basal pinnae reduced not decrescent, *pinnae* subsessile, oblong-acute to narrowly deltate, somewhat falcate, auriculate, auricle deltate and overlapping *rhachis* below, margin serrato-dentate, glabrous and with rounded hydathodes above, subglabrous below; *rhachis* brown, set with linear-attenuate pale brown to castaneous, fimbriate-based scales c. 4 mm long with a dark, thickened central area, persistent at pinna bases. *Sori* semi-lunate, opening towards pinna apex; *indusium* reniform, membranous, entire, c. 1,2 × 0,7 mm. Fig. 53:1.

*N. exaltata* is an extremely variable and very commonly cultivated fern. It has escaped in parts of Cape Province and Natal, and in the Mbabane area of Swaziland. Terrestrial or epiphytic. Map. 145.

Vouchers: *Dahlstrand* 1387 (PRE); *Schütte* 30 (BOL); *Ward* 6712 (BOL; NU).



## 2. ARTHROPTERIS

**Arthropteris** J. Sm. in Hook. f., Fl. Nov. Zeyl. 2: 43 (1854); Engl., Pflanzenw. Afr. 2: 18 (1908); Tardieu-Blot in Mém. Inst. fr. Afr. noire 28: 157 (1953); in Fl. Madag. 5, 1: 53 (1958); Alston in F.W.T.A. edn 2, Suppl. 52 (1959); Tardieu-Blot in Fl. Gabon 8: 88 (1964); in Fl. Camer. 3: 112 (1964); Schelpe in F.Z. Pterid.: 162 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 70 (1973); in C.F.A. Pterid.: 129 (1977). Type species: *A. tenella* (G. Forst.) J. Sm. ex Hook. f. (= *Polypodium tenellum* G. Forst.).

Rhizome creeping, solenostelic, set with brown rhizome-scales. *Fronds* spaced; *stipe* articulated; *lamina* pinnate to 2-pinnatifid; *pinnae* articulated to rhachis; *veins* free. *Sori* circular, terminal on veins, intramarginal; *indusium* reniform.

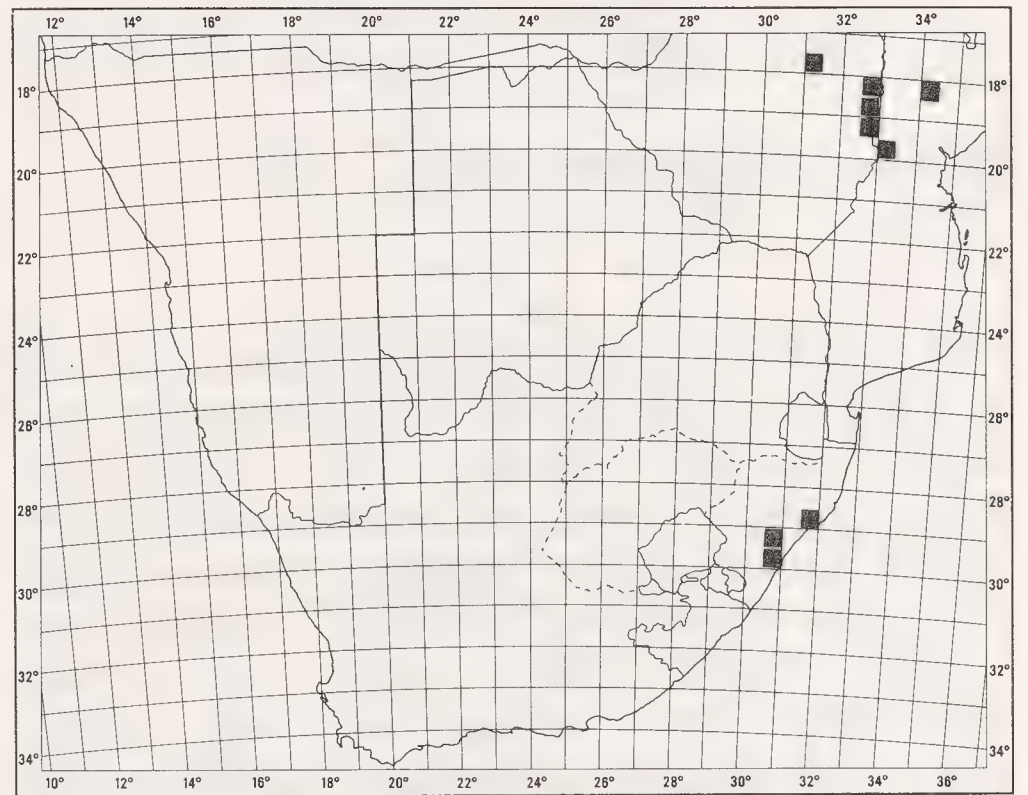
A widely distributed genus of about 20 species, of which 4 occur in continental Africa, one in our area.

**Arthropteris monocarpa** (Cordem.) C. Chr. in Cat. Pl. Madag., Pterid.: 32 (1932); Schelpe in F.Z. Pterid.: 163, t. 50 (1970); in C.F.A. Pterid.: 129, t. 23 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 324, t. 236 (1983). Type: Réunion, Boivin 881 (P, holo.).

*Nephrodium monocarpum* Cordem. in Bull. Soc. Sci Arts Réunion, 1890–91: 186 (1891).

*Dryopteris orientalis* sensu Sim, Ferns S. Afr. edn 2: 91, t. 9 (1915).

Rhizome widely creeping, c. 2 mm in diameter, set with subcircular to broadly ovate, entire rhizome-scales up to 1,5 mm long. *Fronds* widely spaced, arching, thinly herbaceous; *stipe* pale brown, glabrous at maturity, up to 0,18 m long; *lamina* oblong-lanceolate, acute, up to 0,33 × 0,12 m, deeply 2-pinnatifid, basal pinnae somewhat reduced; *pinnae* oblong-lanceolate, attenuate, very broadly oblong basally, up to 75 × 15 mm, deeply pinnatifid into narrowly oblong, obtuse, undulate, crenate lobes, very thinly pubescent on costa, costules and veins on under surface; *rhachis* stramineous, pubescent with minute, pale brown hairs. *Sori* usually solitary on each lobe, but if 2–3 then occurring along acroscopic margin, up to 1,5 mm in diameter; *indusium* membranous, entire, c. 1 mm in diameter. Fig. 53: 2.



MAP 146.—*Arthropteris monocarpa*

Natal, Zimbabwe, Mozambique, Angola, Malawi, Zaire, Zambia, Burundi, Tanzania, Uganda, Kenya, Sudan, Cameroun, Nigeria, Ghana, Ivory Coast, Liberia, Sierra Leone, Fernando Po, São Tomé, Madagascar, Comoro Islands and Réunion. A predominantly forest species, growing over mossy boulders and fallen tree trunks in shade in moist forest. Map 146.

Vouchers: Devlin 59 (NU); Medley Wood 11953 (PRE); Schelpe 3140 (BM).

## 3. OLEANDRA

**Oleandra** Cav. in Ann. Hist. Nat. 1, 2: 115 (1799); Engl., Pflanzenw. Afr. 2: 17 (1908); Tardieu-Blot in Mém. Inst. fr. Afr. noire 28: 156 (1953); in Fl. Madag. 5, 1: 52 (1958); Alston in F.W.T.A. edn 2, Suppl. 52 (1959); Tardieu-Blot in Fl. Gabon 8: 84 (1964); in Fl. Camer. 3: 106 (1964); Pichi-Sermolli in Webbia 20: 754 (1965); Schelpe in F.Z. Pterid.: 165 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 71 (1973); in C.F.A. Pterid.: 131 (1977). Type species: *O. neriiformis* Cav.



Rhizome long, creeping, dictyostelic, set with brown, attenuate rhizome-scales; *roots* sparingly produced at wide intervals. *Fronde*s closely or widely spaced, simple, entire, uniform (rarely dimorphic); *stipe* articulated; *veins* free. *Sori* superficial on veins, in single rows on each side of midrib; *indusium* reniform.

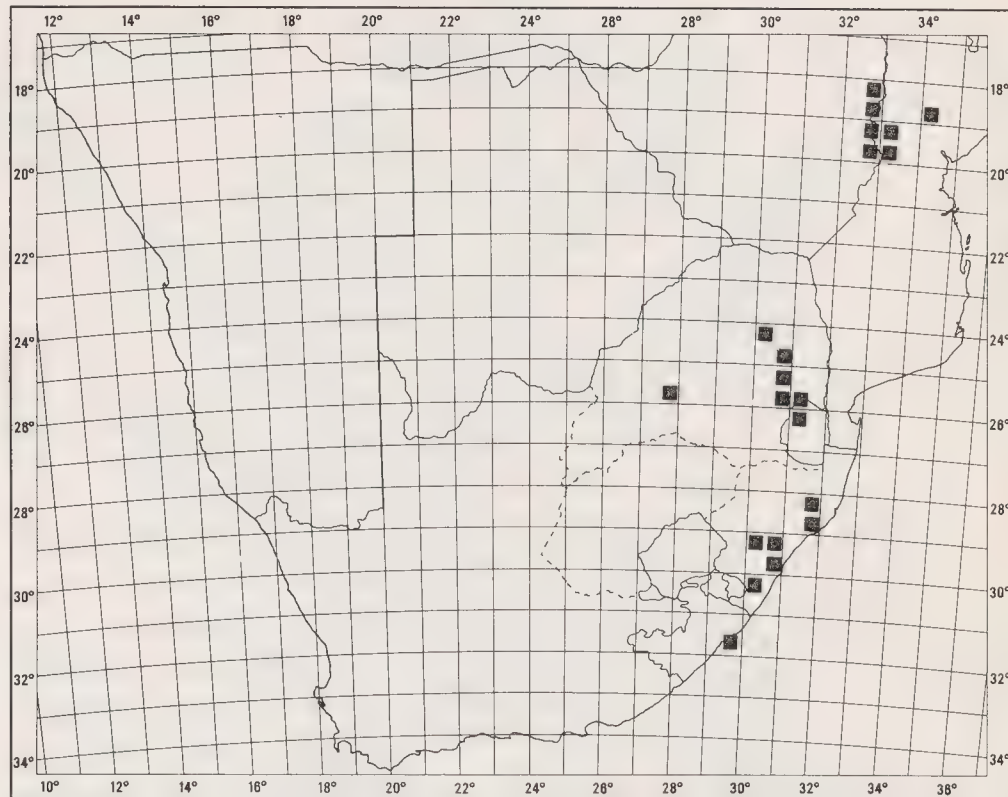
A genus of about 40 tropical species, of which 4 occur in continental Africa, one in our area.

***Oleandra distenta* Kunze** in Bot. Ztg 9: 347 (1851); Schelpe in F.Z. Pterid.: 165, t. 51 (1970); in C.F.A. Pterid.: 131, t. 24 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 326, t. 238 (1983). Type: Transvaal, Magaliesberg, Zeyher s.n., Herb. Kunze (LZ, holo.†); Zeyher 1869 (BM, ?iso.!).

*Oleandra densifrons* Kunze in Bot. Ztg 9: 347 (1851). Type: Port Natal, inter Omfondi et Tagela, Gueinzius s.n. (LZ, holo.†); Port Natal, Gueinzius s.n., Herb. Mettenius (B, lecto.).

*Oleandra articulata* sensu Sim, Ferns S. Afr. edn 2: 124, t. 34 fig. 1 (1915).

Rhizome very widely creeping, up to 4 mm in diameter, sometimes producing short side-branches, set with appressed (rarely squarrose), narrowly lanceolate, attenuate, variously ciliate rhizome-scales c. 5 mm long with a darker area around point of attachment. *Fronde*s tufted or spaced, thinly membranous to thinly coriaceous, articulated, deciduous; *stipe* stramineous, up to 45 mm long, with or without scales; *lamina* usually with caudate apex and broadly cuneate base, subentire to undulate, up to 330 × 65 mm, upper surface glabrous at maturity, lower surface glabrous or thinly pubescent with minute hairs; *costa* prominent below, stramineous to light castaneous. *Sori* circular, up to 2 mm in diameter, set in an irregular line; *indusia* glabrous to glandular, brown, entire, up to 1.5 mm in diameter. Fig. 54: 2.



MAP 147.—*Oleandra distenta*

Transkei, Natal, Transvaal, Zimbabwe, Mozambique, Malawi, Zambia, Angola, Zaire, Ruanda, Kenya, Uganda, Tanzania, Sudan, Cameroun, Nigeria, Togo, Ghana, Ivory Coast, Sierra Leone, São Tomé, Seychelles, Madagascar, Mauritius and Comoro Islands. In Southern Africa *O. distenta* is usually found on exposed rock outcrops or scrambling over rocks in light shade in scrub; in tropical Africa it can occur as a high-level epiphyte on forest trees; 800–1 900 m. Deciduous during the dry season. Map 147.

Vouchers: Burrows 1330, 1372 (BOL; NBG); Schweickerdt 2014 (BM; PRE); Ward 2258 (BOL; MO; NPB; NU).

#### 4. DAVALLIA

***Davallia* J.E. Sm.** in Memorie Accad. Sci. Torino 5: 414, t. 9 fig. 6 (1793); Engl., Pflanzenw. Afr. 2: 20 (1908); Tardieu-Blot in Mém. Inst. fr. Afr. noire 28: 61 (1953); in Fl. Madag. 5, 1: 39 (1958); Alston in F.W.T.A. edn 2, Suppl. 53 (1959); Tardieu-Blot in Fl. Gabon 8: 90 (1964); in Fl. Camer. 3: 118 (1964); Schelpe in F.Z. Pterid.: 167 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 71 (1973); in C.F.A. Pterid.: 133 (1977). Lectotype species: *D. canariensis* (L.) J.E. Sm. (= *Trichomanes canariensis* L.).

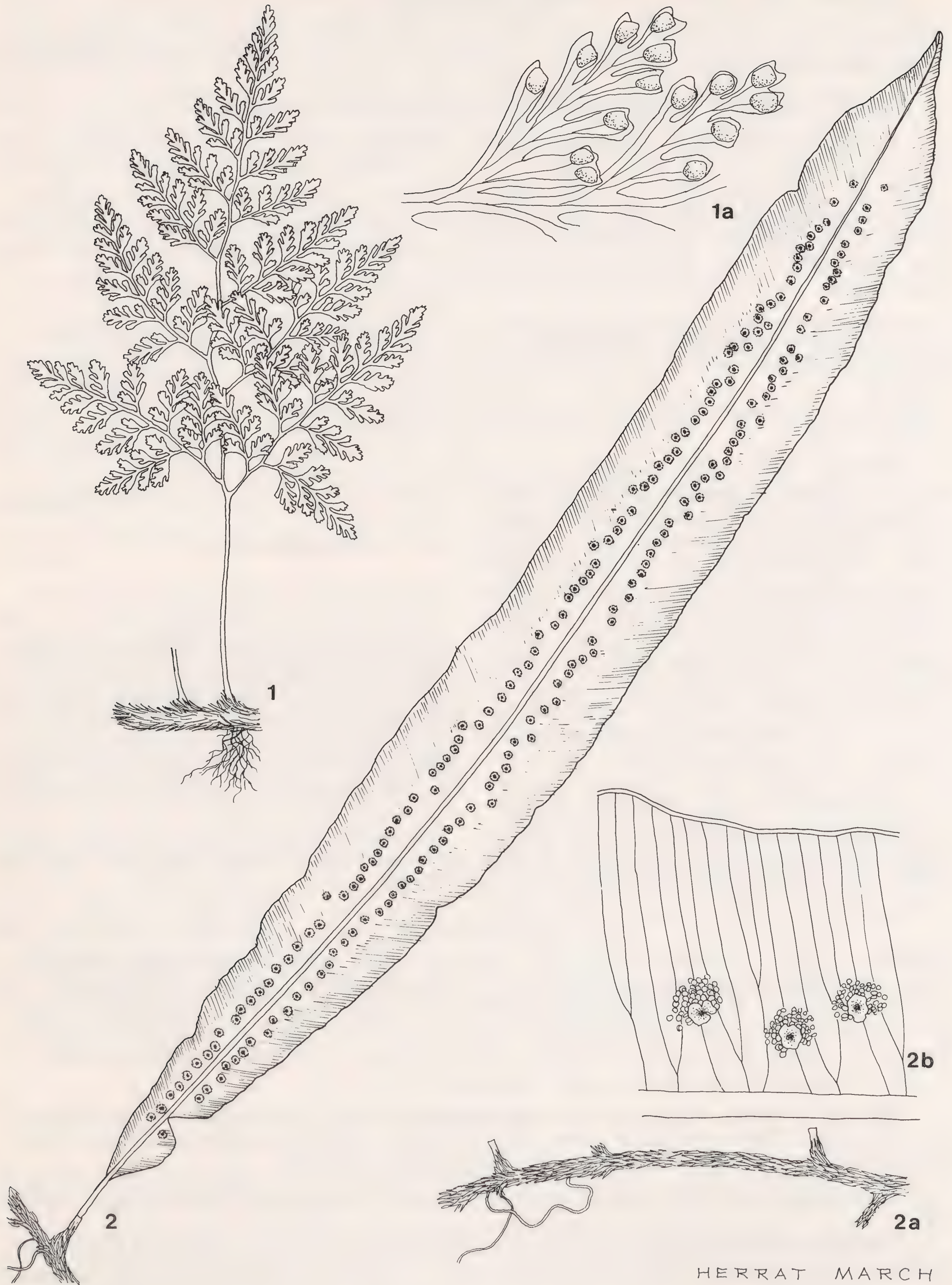
Rhizome creeping, dictyostelic, set with attenuate, ciliate rhizome-scales. *Fronde*s spaced; *stipe* articulated; *lamina* deltate to ovate, much dissected, coriaceous, glabrous; *veins* free. *Sori* terminal on veins; *indusium* elongate, fused to lamina at base and sides.

A predominantly Asiatic and Polynesian genus of about 40 species, of which only one occurs in tropical and Southern Africa.

***Davallia chaerophylloides* (Poir.) Steud.**, Nomencl. Bot., Crypt. 146 (1824); Sim, Ferns S. Afr. edn 2: 128, t. 37 (1915); Schelpe in

F.Z. Pterid.: 167, t. 52 (1970); in C.F.A. Pterid.: 133, t. 25 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 327, t. 239 (1983). Syntypes:





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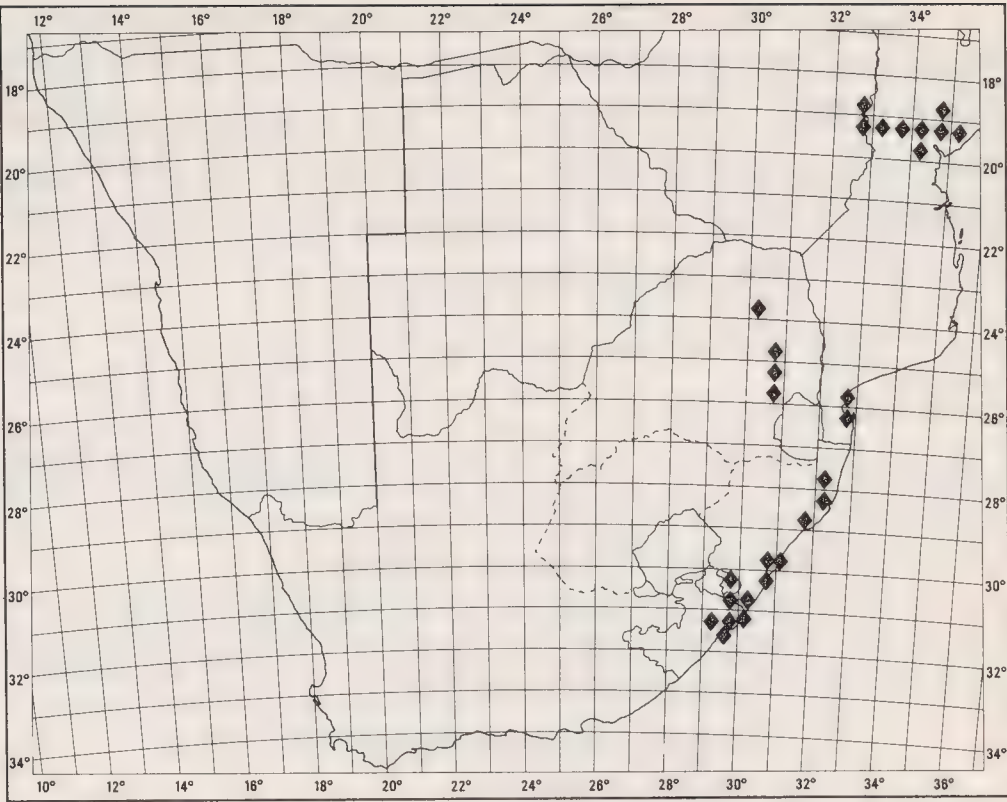
Madagascar, Herb. De Candolle (G!), Herb. Thouars (P!).

*Trichomanes chaerophylloides* Poir. in Lam., Encycl. 8: 80 (1808). *Humata chaerophylloides* (Poir.) Desv. in Mém. Soc. Linn., Paris 6, 2: 325 (1827).

*Davallia nitidula* Kunze in Linnaea 10: 545 (1836). Syntypes: Transkei, Umzimkulu, Drège s.n.; between the Umzimvubu and Umsikaba Rivers, Drège s.n. (LZ†; BM, iso!).

*Davallia denticulata* var. *intermedia* Mett. ex Kuhn, Fil. Afr. 158 (1868). Syntypes: Natal, Gueinzius, Drège; Angola, Welwitsch 56; Tropical Africa, Mann; Comoro Islands, Peters s.n. and Boivin 1599; Madagascar, Boivin, Lyall; Seychelles, Kersten 70.

Rhizome up to 15 mm in diameter, set with brown, narrowly lanceolate, fimbriate, hair-pointed rhizome-scales up to 8 mm long with pale margins. *Fron*ds widely spaced, thin, arching; *stipe* glabrous at maturity, up to 0,44 m long, with tufted scales about the extreme base; *lamina* ovate-deltate, up to 0,7 × 0,5 m, deeply 4- to 5-pinnatifid, basal pinnae longest and developed basiscopically; *pinnae* deltate to oblong, acute-acuminate; *ultimate segments* narrowly deltate to trapeziform, glabrous, incised into spatulate to cuneate lobes up to 1,5 mm long; *rhachis* and secondary rhachises stramineous, glabrous. *Sori* solitary on the lobes on vein-endings, up to 1 mm in diameter, subtended by teeth; *indusium* very broadly oblong, membranous, entire. Fig. 54: 1.



MAP 148.—*Davallia chaerophylloides*

Transkei, Natal, Transvaal, Zimbabwe, Mozambique, Zambia, Angola, Zaire, Burundi, Tanzania, Uganda, Kenya, Sudan, Nigeria, Togo, Ghana, Ivory Coast, Liberia, São Tomé, Fernando Po, Annobon, Madagascar, Comoro Islands, Rodrigues and Seychelles. Also recorded from Cameroun, Guinea and the Mascarene Islands by Tardieu-Blot (1964). In Southern Africa *D. chaerophylloides* occurs sporadically in a variety of habitats ranging from sheltered sandstone crevices to decomposing logs on forest floors at altitudes from near sea level to 1 500 m. Map 148.

Vouchers: Medley Wood s.n. (BOL; GRA; PRE; SAM); Mogg 17212 (PRE); Strey 7245 (BOL; NH; NU).

In higher light intensities in rock crevice habitats the fronds are considerably smaller and of thicker texture than in forest-grown specimens.

ASPLENIACEAE

Epiphytic, lithophytic or terrestrial plants with creeping or erect rhizomes set with clathrate, usually dark-coloured rhizome-scales. *Fron*ds simple or variously pinnately dissected; *stipes* not articulated to rhizome, with 2 vascular strands at base which unite upwards to form a 4-armed strand; *venation* free or anastomosing marginally. *Sori* usually linear, borne on costal side of vein and with a narrow or obsolete indusium. *Sporangia* with long stalks; *spores* monolete, with perispore.

- Under surface of pinnae glabrous or set with scattered small scales ..... 1. *Asplenium*
- Under surface of pinnae set with dense imbricate scales..... 2. *Ceterach*

The genus *Ceterach* has been regarded by some authors (e.g. Crabbe *et al.*, 1973) as congeneric with *Asplenium*.

1. ASPLENIUM

*Asplenium* L., Sp. Pl. 1078 (1753); Gen. Pl. edn 5: 485 (1754); Engl., Pflanzenw. Afr. 2: 25 (1908); Tardieu-Blot in Mém. Inst. fr. Afr. noire 28: 167 (1953); in Fl. Madag. 5, 1: 182 (1958); Alston in F.W.T.A. edn 2, Suppl. 53 (1959); Tardieu-Blot in Fl. Gabon 8: 120 (1964); in Fl. Camer. 3: 174 (1964); Schelpe in F.Z. Pterid.: 167 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 71 (1973); in C.F.A. Pterid.: 135 (1977). Lectotype species: *A. marinum* L.

FIG. 54.—1, *Davallia chaerophylloides*, part of plant, × 0,6; 1a, detail of lower surface of ultimate segments, × 3,6 (Schelpe 5030). 2, *Oleandra distenta*, part of plant, × 0,6; 2a, rhizome, × 0,6; 2b, detail of portion of fertile lamina, × 3,6 (Johnstone 129).



Rhizomes erect or creeping, dictyostelic, set with clathrate rhizome-scales. *Fronds* simple to 4-pinnatifid, glabrous, pubescent or set with scattered scales, gemmiferous, i.e. with a bud or small plant near apex, or not (rarely proliferating at lamina base); *stipe* black, castaneous or greenish, matt or nitid, glabrous or set with clathrate scales (rarely with hairs); *venation* pinnate or flabellate, free. *Sori* usually elongate (but about as long as broad in some species), borne on costal side of a vein; *indusium* narrow.

A cosmopolitan genus of over 600 species.

1a Venation pinnate:

2a Fronds dimorphous, fertile fronds longer and narrower than sterile fronds ..... 1. *A. christii*

2b Fronds not dimorphous:

3a Fronds gemmiferous on rhachis:

4a Proliferating bud borne at end of an extension of rhachis ..... 9. *A. sandersonii*

4b Proliferating bud borne on rhachis on or below terminal segment:

5a Rhachis pubescent below ..... 7. *A. protensum*

5b Rhachis not pubescent below:

6a Pinnae pinnatifid:

7a Mid pinna-lobes all usually bifid or more divided ..... 6. *A. × flexuosum*

7b Mid pinna-lobes usually entire:

8a Basispic pinna-lobes 1 to 3, the first arising between second and fourth acroscopic lobe; pinnae trapeziform ..... 17. *A. dregeanum*

8b Basispic pinna-lobes 6 or more, the first arising between first and second acroscopic lobes; pinnae ovate-lanceolate ..... 18. *A. preussii*

6b Pinnae simple:

9a Sori borne on unforked veins; the straight basispic edge half as long as pinna or longer ..... 14. *A. lunulatum*

9b Sori borne on forked veins; straight basispic edge very much shorter than pinna itself:

10a Margin evenly and shallowly crenate-serrate ..... 5. *A. gemmiferum*

10b Margin with alternating deeper and shallower incisions ..... 4. *A. boltonii*

3b Fronds not gemmiferous on rhachis:

11a Lamina pinnate to 2-pinnatifid:

12a Lamina very narrowly linear, margin shallowly and evenly crenate or dentate:

13a Plants stoloniferous with naked stolons; stipe greenish ..... 10. *A. stoloniferum*

13b Plants not stoloniferous; stipe castaneous, nitid:

14a Fertile pinnae bearing one (or at most two) sori ..... 13. *A. monanthes*

14b Fertile pinnae bearing numerous sori:

15a Pinnae sessile, base broadened and overlapping rhachis ..... 12. *A. platyneuron*

15b Pinnae shortly petiolate, base not conspicuously overlapping rhachis ..... 11. *A. trichomanes*

12b Lamina lanceolate, elliptic or ovate (if somewhat linear then margin deeply serrate, some serrations emarginate):

16a Rhizome creeping; fronds widely spaced; sori borne very close to costa ..... 8. *A. friesiorum*

16b Rhizome erect; fronds tufted; sori borne at an angle to costa:

17a Margin unequally incised to form multifid lobes, alternating deeper and shallower incisions, or a separate acroscopic lobe:

18a Pinnae simple, or only acroscopic lobe separate; lamina membranous to herbaceous:

19a Lamina decrescent basally ..... 15. *A. erectum*

19b Lamina not decrescent basally ..... 16. *A. inaequilaterale*

18b Pinnae pinnatifid; lamina coriaceous ..... 6. *A. × flexuosum*

17b Margin evenly serrate:

20a Sori borne along outermost branch-vein of a fork, all of similar lengths; margin bluntly serrate ..... 2. *A. anisophyllum*

20b Sori borne along both branch-veins of a fork, of irregular lengths; margin sharply serrate ..... 3. *A. prionitis*

11b Lamina 2-pinnate to 4-pinnatifid:

21a Sori submarginal, solitary on ultimate segments of frond:

22a Sori almost terminal on ultimate segments ..... 19. *A. theciferum* var. *concinnum*

22b Sori lateral on ultimate segments:

23a Lamina conspicuously expanded at sorus; sori about as long as broad ..... 21. *A. hypomelas*

23b Lamina not expanded at sorus; sori more than twice as long as broad ..... 20. *A. rutifolium*

21b Sori intramarginal, 2 or more on the ultimate segments:

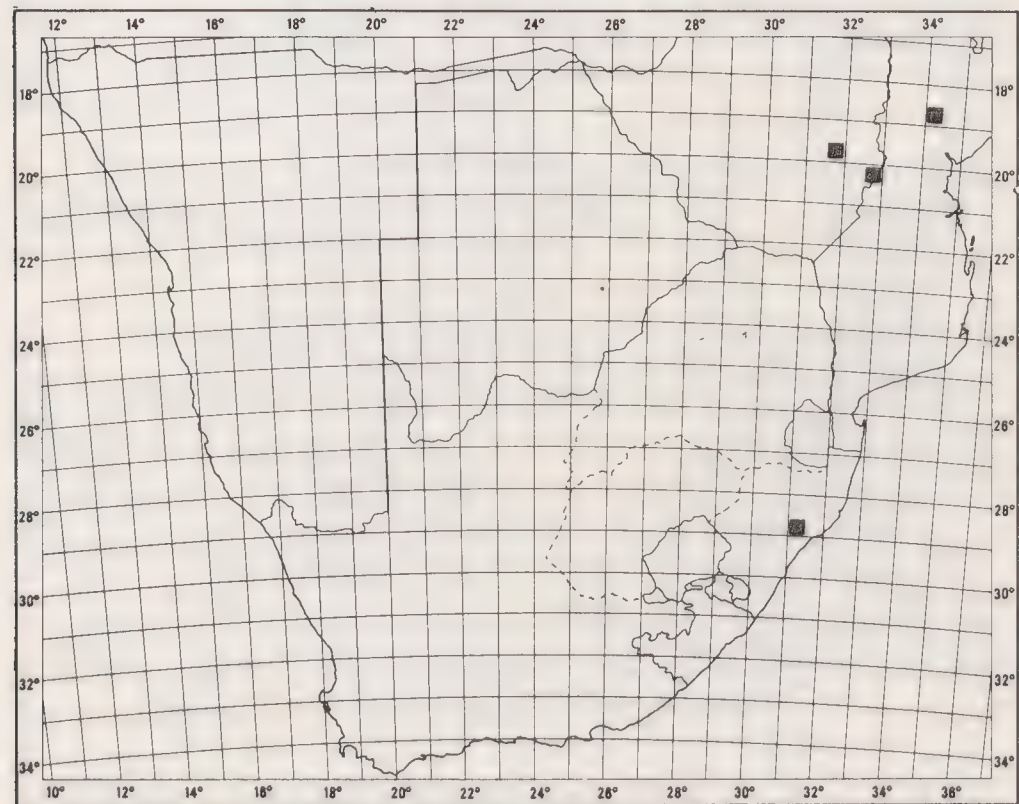
24a Lamina narrowly elliptic, lower pinnae gradually decrescent; margin crenate or obtusely dentate ..... 22. *A. lobatum*



- 24b Lamina ovate or deltate, lower pinnae not decrescent; margin sharply dentate:  
 25a Rhizome erect; lamina narrowly ovate; indusium erose ..... 23. *A. varians* subsp. *fimbriatum*  
 25b Rhizome creeping; lamina deltate; indusium entire ..... 24. *A. adiantum-nigrum*
- 1b Venation flabellate:  
 26a Fronds gemmiferous ..... 25. *A. blastophorum*  
 26b Fronds not gemmiferous:  
 27a Fronds widely spaced on rhizome ..... 26. *A. splendens*  
 27b Fronds tufted:  
 28a Rhizome-scales black; pinnae deeply pinnatifid into 3 to 5 lobes ..... 27. *A. simii*  
 28b Rhizome-scales brown; pinnae deeply pinnatifid into more than 5 lobes:  
 29a Fronds with few scales, without long hair-points; weakly 2-pinnatifid ..... 28. *A. lividum*  
 29b Fronds set with numerous scales, with long hair-points; very deeply 2-pinnatifid ..... 29. *A. aethiopicum*

1. *Asplenium christii* Hieron. in Engl., Pflanz. Ost.-Afr. 82 (1895); Schelpe in F.Z. Pterid.: 172 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 332, t. 241 (1983). Type: Tanzania, Usambara, Holst 2307 (B, holo.!-BOL, photo.!: K!).

Rhizome erect or ascending, c. 4 mm in diameter, set with dark brown, lanceolate, acuminate, entire rhizome-scales up to  $2.5 \times 0.5$  mm. Fronds tufted, pinnate, dimorphous, fertile fronds gemmiferous,  $1\frac{1}{2}$  to 2 times as long as sterile non-gemmiferous fronds; stipe matt grey-green, sparsely scaly; fertile lamina lanceolate, up to  $240 \times 75$  mm; sterile lamina somewhat ovate, up to  $130 \times 90$  mm; pinnae in up to 9 pairs, oblong lower pinnae grading upwards into smaller obovate-obtuse ones, base unequally cuneate, lower pinnae not decrescent or sometimes auriculate acroscopically, margin serrate, upper surface glabrous, lower surface set with fimbriate to substellate scales. Sori up to 30 per pinna, c. 9 mm long near pinna-base; indusium membranous, somewhat erose, c. 0.5 mm broad, folding back on itself at maturity. Fig. 55: 1.



MAP 149.—*Asplenium christii*

Natal, Zimbabwe, Mozambique, Tanzania and Kenya. Undergrowth of moist forest, 1 050–1 300 m. Map 149.

Voucher: Forbes 690 (NH).

2. *Asplenium anisophyllum* Kunze in Linnaea 10: 511 (1836); Schelpe in F.Z. Pterid.: 170 (1970); in C.F.A. Pterid.: 138 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 337, t. 247 (1983). Type: Transkei, between the Umzimvubu and Umsikaba Rivers, Drège s.n. (LZ, holo. †; BM, lecto.!).

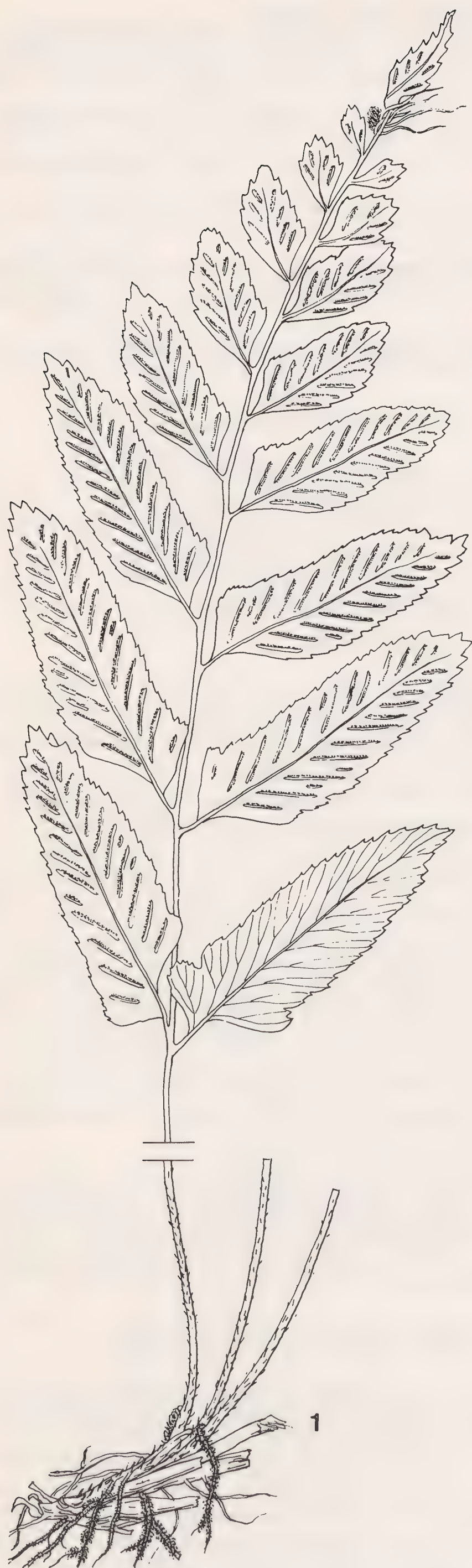
Rhizome erect, c. 10–20 mm in diameter, set with pale brown to brown, concolorous, broadly lanceolate, somewhat fimbriate and attenuate rhizome-scales c.  $12 \times 3.5$  mm. Fronds tufted, herbaceous, not gemmiferous; stipe matt purplish brown, glabrous except for scales basally; lamina ovate to ovate-elliptic, up to  $880 \times 320$  mm, pinnate, basal pinnae somewhat reduced; pinnae in 10–20 pairs, up to  $220 \times 24$  mm, base unequally cuneate, margin regularly crenate-dentate, upper surface glabrous, lower surface set with scattered, minute, substellate scales on costae and veins. Sori extending along veins from near costa half-way to margin, 4–6 mm long at maturity; indusium membranous, yellowish, entire, c. 1 mm broad. Fig. 56: 2.

Transkei, Natal, Swaziland, Transvaal, Zimbabwe, Mozambique, Malawi, Angola, Tanzania, Uganda, Kenya, Liberia and Madagascar. A low-level epiphyte in deep shade, or terrestrial on forest floor, or lithophytic on moist rock faces or boulders between 1 200 and 2 300 m altitude. Map 150.

Vouchers: Schelpe 6175 (BM; BOL); Strey 8871 (BOL; NU); Thorncroft 19, (PRE); 99 (PRE).

3. *Asplenium prionitis* Kunze in Linnaea 10: 511 (1836); Sim, Ferns S. Afr. edn 2: 152, t. 55 (1915); W. B. G. Jacobsen, Ferns Sthn Afr. 338, t. 248 (1983). Type: Transkei, between the Umzimvubu, Umtentu and Umzimkulu Rivers, Drège s.n. (LZ, holo. †; BM, lecto.!: HBG-BOL, photo.!: L-BOL, photo.!).





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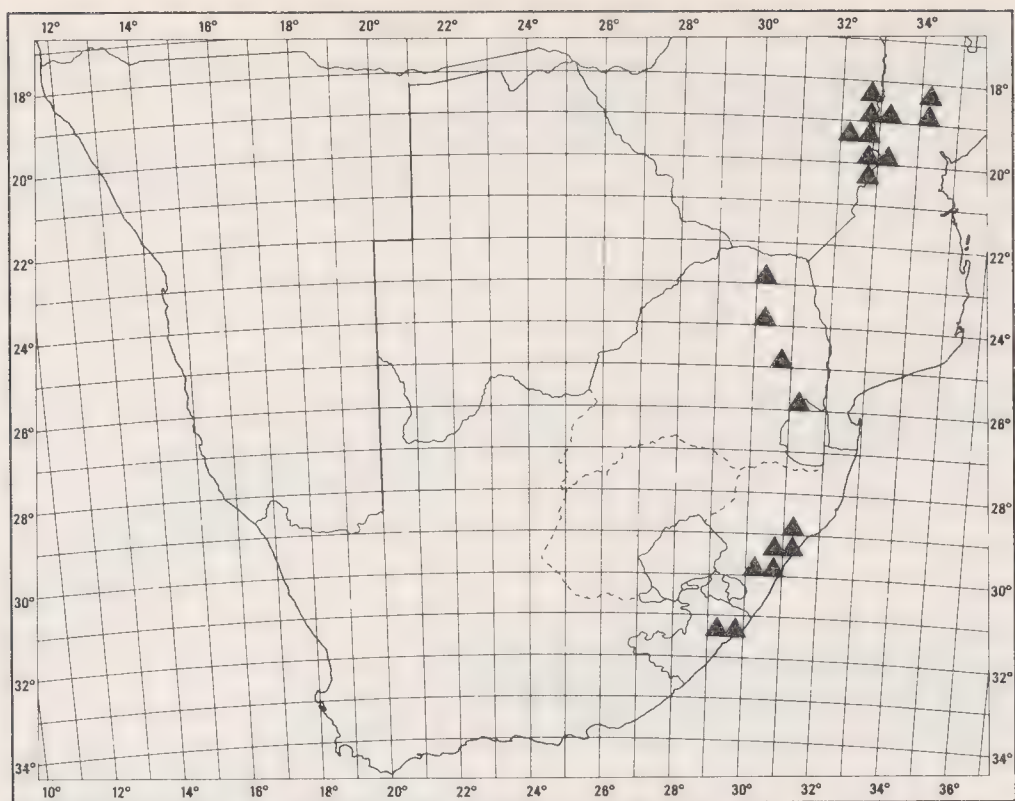


2a

2

HERRAT MARCH





MAP 150.—*Asplenium anisophyllum*

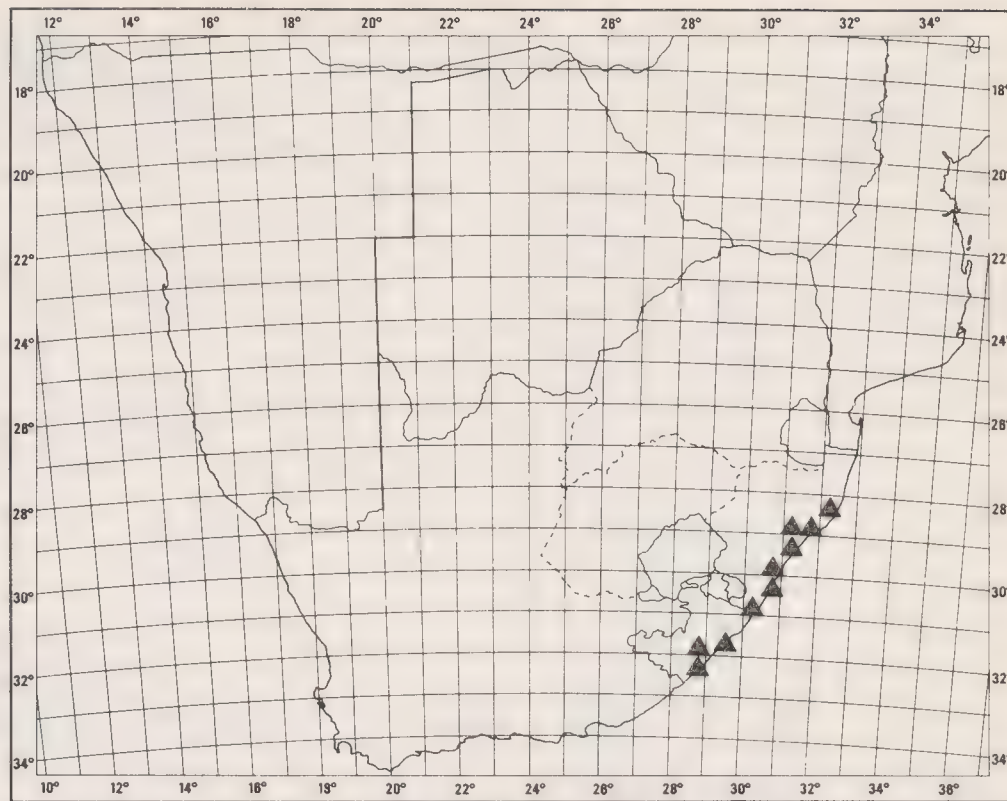
Rhizome erect, c. 40 mm in diameter, set with brown, lanceolate-attenuate, hair-pointed, entire rhizome-scales, c. 8 mm long. *Fron*ds tufted, thinly coriaceous, not gemmiferous; *stipe* green or purplish brown when dry, set with scattered hair-like scales; *lamina* ovate-oblong, up to 520 × 300 mm, pinnate, basal pinnae reduced; *pinnae* in c. 6 pairs, oblong-lanceolate (reduced pinnae ovate-deltate), base broadest, truncate, overlapping rhachis acroscopically, margin sharply serrate-dentate, upper surface glabrous, lower surface set with occasional hair-like scales. *Sori* borne midway between costa and margin, of irregular lengths, up to 18 mm long, the longest on the outermost branch-vein of a fork; *indusium* stramineous, thickly membranous, entire, c. 0,7 mm broad. Fig. 57: 1.

Transkei and Natal. Also recorded from Madagascar by Tardieu-Blot (1958). A rare to locally frequent coastal forest species which occurs in deep shade either as a low-level epiphyte or as a lithophyte on mossy boulders, at altitudes below 600 m. Map 151.

Vouchers: Pegler 537 (PRE); Strey 5924 (NU); Taylor 2611 (BOL); Ward 504 (BM; NU).

4. *Asplenium boltonii* Hook. ex Schelpe in Bolm Soc. broteriana, sér. 2, 41: 204 (1967); Schelpe in F.Z. Pterid.: 173 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 334, t. 243 (1983). Type: Natal, Bolton s.n. (K, holo. !; BM!).

*Asplenium anisophyllum* var.  $\beta$  Kunze in Linnaea 10: 512 (1836). Type: Cape Province, Philipstown near the Katrivier, Ecklon s.n., Herb. Kunze (LZ, holo. †).



MAP 151.—*Asplenium prionitis*

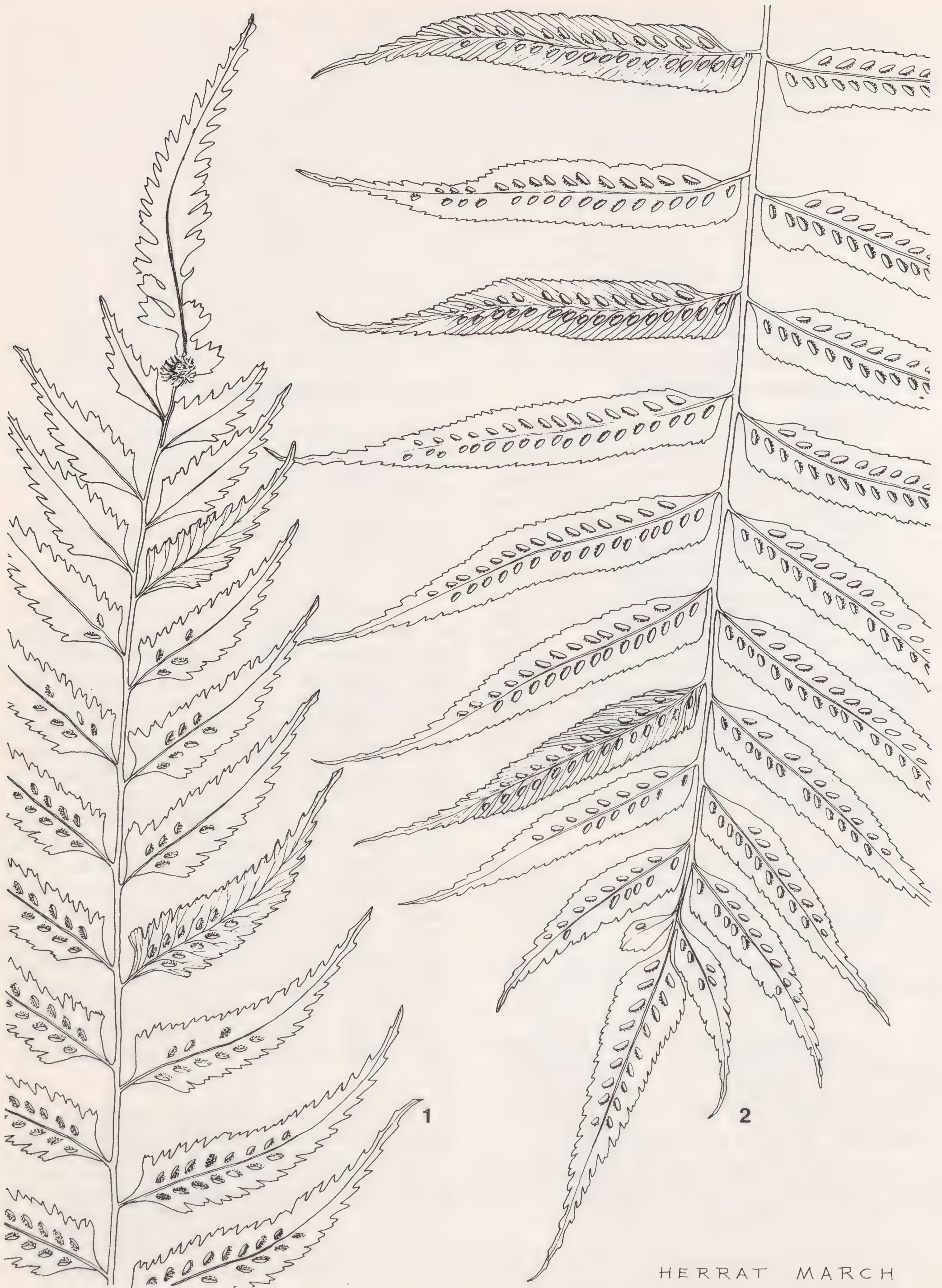
*Asplenium anisophyllum* var. *elongatum* Mett. in Abh. senckenb. naturforsch. Ges. 3: 143 (1859), reimpr. in Mett., Farngatt. 6: 99 (1859). Syntypes from South Africa and Réunion.

*Asplenium anisophyllum* sensu Sim, Ferns S. Afr. edn 2: 151, t. 53 (1915).

Rhizome erect, up to 20 mm in diameter, set with reddish-castaneous, somewhat serrulate, lanceolate, attenuate rhizome-scales c. 10 mm long with a somewhat darker central portion and narrow paler borders (composed of hyaline thin-walled cells). *Fron*ds tufted, herbaceous, gemmiferous; *stipe* matt grey-green, densely set at first with sinuose hair-like scales; *lamina* ovate-lanceolate, usually up to 540 × 160 mm (rarely 1050 × 240 mm), pinnate, basal pinnae slightly reduced; *pinnae* in up to 28 pairs, lanceolate-attenuate, base broad and unequally cuneate, margin dentate with usually alternating deeper and shallower incisions, a single vein forking to end in this pair of teeth, upper surface glabrous, lower surface set with occasional minute substellate scales. *Sori* borne along outermost branch-vein of a fork, c. 6 mm long; *indusium* pale membranous, oblong-elliptic, entire, c. 0,7–1,5 mm broad. Fig. 56: 1.

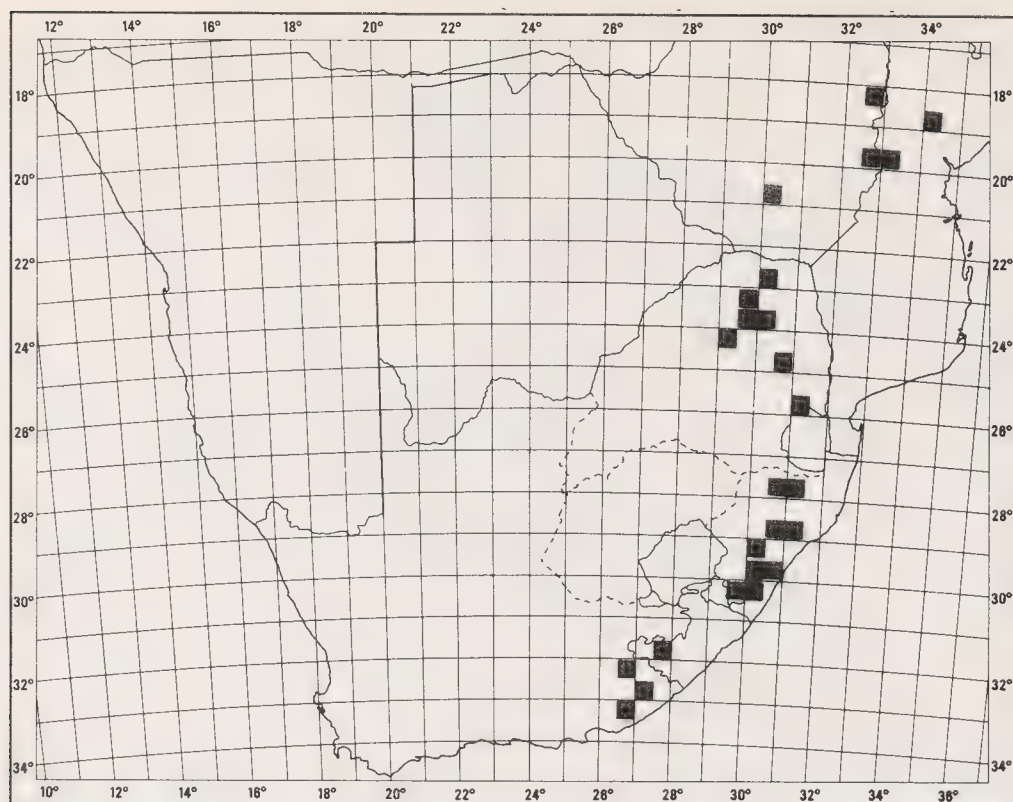
Eastern Cape Province, Transkei, Natal, Transvaal, Zimbabwe, Mozambique, Malawi, Zambia, Zaire, Tanzania, Kenya, Uganda, Madagascar and Réunion. A forest species, sporadic in deep shade on humus-covered boulders and forest floors, and occasionally as a low-level epiphyte, between 660 and 1 980 m altitude. Map 152.





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MAP 152.—*Asplenium boltonii*

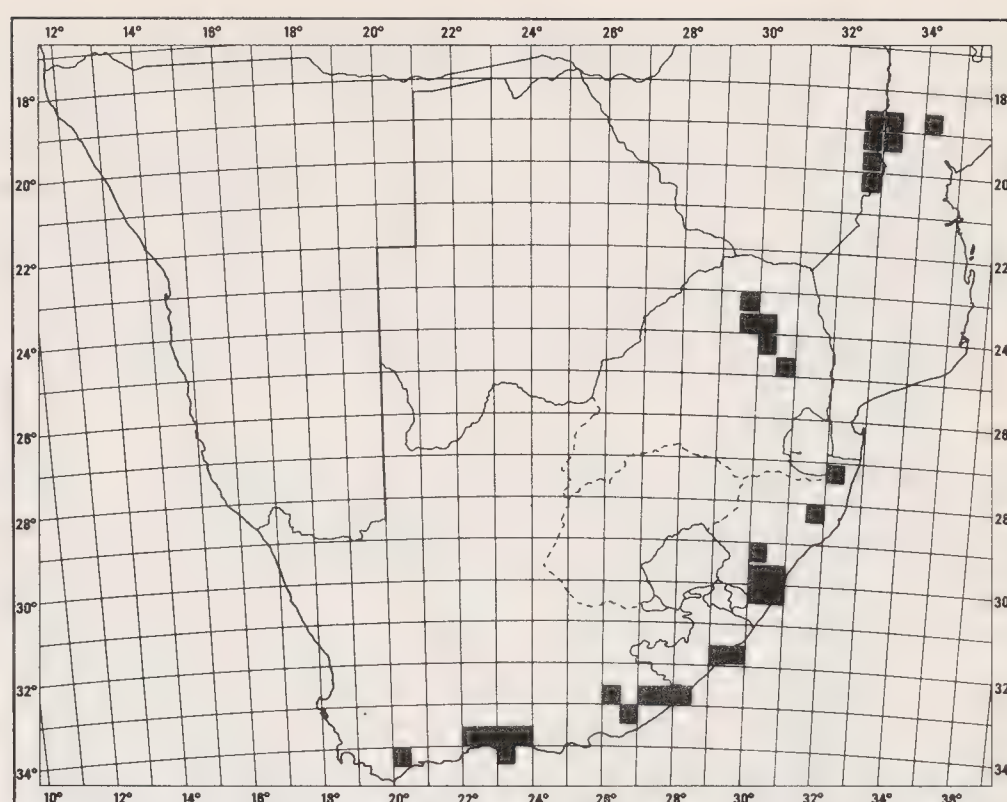
Vouchers: *Fisher* 904 (BOL; NH; NU); *Flanagan* 1761 (GRA; PRE); *Maguire* 915 (BOL; NBG); *Thorncroft* 98 (GRA; PRE).

5. *Asplenium gemmiferum* Schrad. in Gött. Gel. Anz. 1818: 916 (1818); Sim, Ferns S. Afr. edn 2: 154, t. 57 fig. 1 (1915); Schelpe in F.Z. Pterid.: 173 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 335, t. 244 (1983). Type: Cape Province, ? near Grahamstown, *Hesse* s.n. (?LE, holo.).

Rhizome erect, up to 30 mm in diameter, set with dark brown, nitid, lanceolate, attenuate, irregularly fimbriate rhizome-scales c. 7–9 mm long with reddish margins. *Fronde* tufted, carnose-coriaceous when fresh, gemmiferous; *stipe* matt greyish green, densely scaly at first with fimbriate narrow scales; *lamina* oblong-lanceolate, up to 720 × 260 mm, pinnate; *pinnae* in up to 12 pairs, ovate-lanceolate, acuminate, margin minutely and regularly shallowly serrate, upper surface glabrous, lower surface set with occasional minute hair-like scales. *Sori* extending from near costa two thirds to margin, up to 15 mm long; *indusium* membranous, entire, c. 1 mm broad. Fig. 57: 2.

Cape Province, Transkei, Natal, Transvaal, Zimbabwe, Mozambique, Malawi, Zaire, Tanzania, Kenya, Uganda; also Cameroun and Fernando Po (Tardieu-Blot, 1964). A forest species growing either on forest floors or more usually on humus-covered boulders in deep shade, from near sea level in Cape Province to 1 800 m in Zimbabwe and Mozambique. Map 153.

Vouchers: *Compton* 14334 (NBG; PRE); *Schelpe* 4349 (B; BM; BOL; GH; K; M; MO; P; PRE; S; US); *Ward* 2383 (NPB; NU).



MAP 153.—*Asplenium gemmiferum*

6. *Asplenium* × *flexuosum* Schrad. in Gött. Gel. Anz. 1818: 916 (1818); W. B. G. Jacobsen, Ferns Sthn Afr. 336, t. 245 (1983). Type: Cape Province, ? near Grahamstown, *Hesse* s.n. (?LE, holo.).

*Asplenium gemmiferum* var. *flexuosum* (Schrad.) Sim, Ferns S. Afr. edn 2: 155, t. 58 (1915).

*Asplenium lucidum* Schlechtd., Adumbr. 25, t. 14a (1826), non Burm. f. (1768), nec G. Forst. (1786), nec Salisb. (1796).

*Asplenium discolor* Pappe & Raws., Syn. Fil. Afr. Austr. 17 (1858), non Kunze (1834). *Asplenium gemmiferum* var. *discolor* (Pappe & Raws.) Sim, Ferns S. Afr. edn 2: 156, t. 59 (1915). Syntypes: Cape Province, Knysna, *Dalgairns* s.n. (K!); Albany, *Atherstone* s.n. (K!); Philipstown, *Kat River Ecklon & Zeyher* s.n. (K!).

*Asplenium gemmiferum* var. *laciniatum* Mett., Farngatt. 138 (1959). Iconotype: Schlechtendal, Adumbrationes, t. 14b (1826)!, from Port Natal (Durban).

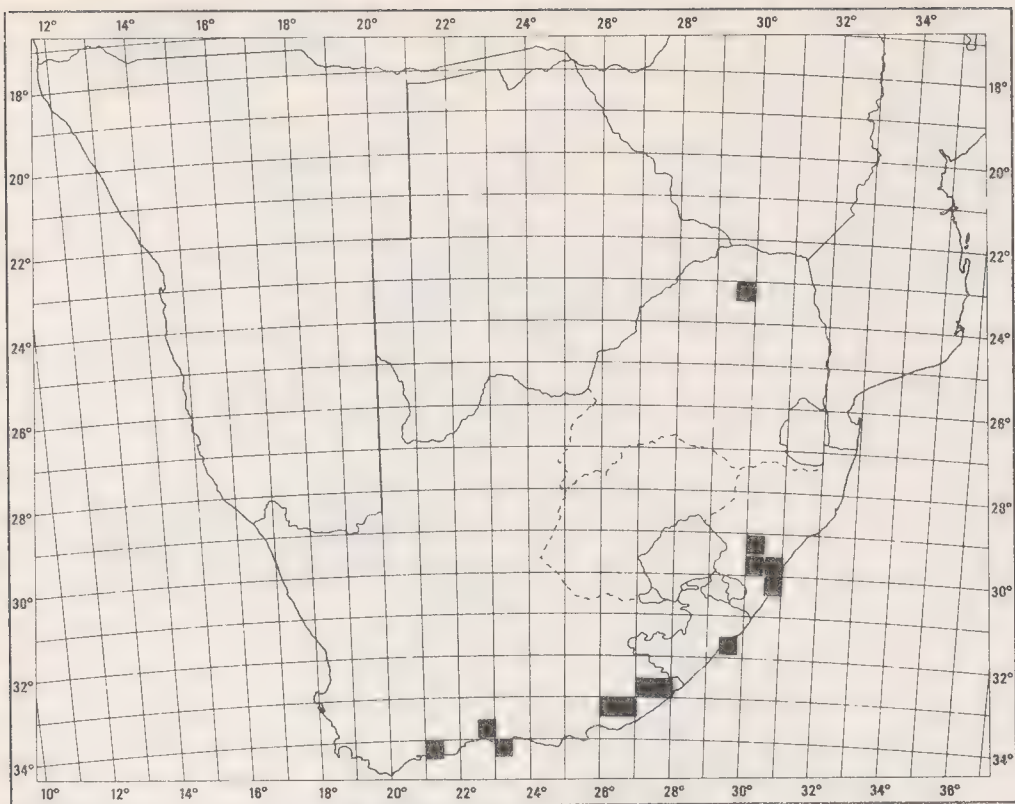
Rhizome erect, c. 30 mm in diameter, set with very dark brown, lanceolate, acuminate, shortly ciliate-fimbriate rhizome-scales c. 8 mm long. *Fronde* tufted, thinly coriaceous, some fronds gemmiferous; *stipe* greenish, becoming somewhat stramineous on drying, set at first with scattered sinuose, hair-like scales; *lamina* ovate-lanceolate, up to 620 × 190 mm, pinnate to 2-pinnatifid, basal pinnae reduced; *pinnae* in c. 10 pairs (up to 24), ovate-lanceolate, base unequally cuneate, auriculate acroscopically, progressively more deeply incised from apex to base into usually 2- or 3-fid oblong to oblanceolate lobes (or occasionally equally incised), upper surface glabrous, lower surface set with



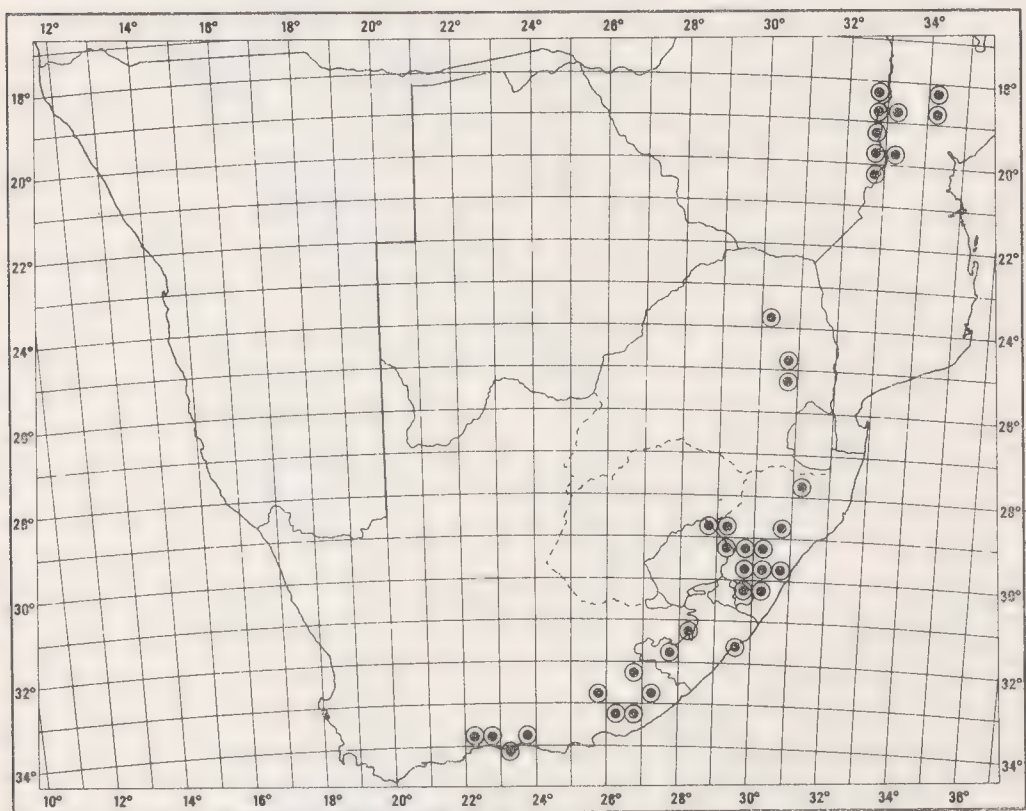


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MAP 154.—*Asplenium* × *flexuosum*



MAP 155.—*Asplenium* *protensum*

scattered hair-like scales c. 1 mm long. *Sori* borne along outermost branch vein of a fork, c. 9 mm long; *indusium* membranous, entire, c. 0,6 mm broad. Fig. 58: 1.

Cape Province, Transkei, Natal and Transvaal. On shady forest floors, up to c. 1 200 m altitude. Map 154.

Vouchers: *Compton* 14343 (NBG; PRE); *Hart* 74 (NU); *Schelpé* 5954 (BM; BOL); *Whellan* 1506 (BOL; SRGH).

*A. × flexuosum* is treated as a putative hybrid between *A. gemmiferum* Schrad. (no. 5) and *A. rutifolium* (Berg.) Kunze (no. 20). The hybrid nature of this taxon was suspected in view of the available living specimens failing to produce normal spores, its low frequency over a wide range and the variability in the incision of the pinnae. The putative parents have been present in some of the localities investigated. Absence of chromosome pairing at meiosis has been observed in the one plant investigated.

7. *Asplenium protensum* Schrad. in Gött. Gel. Anz. 1818: 916 (1818); Sim, Ferns S. Afr. edn 2: 149, t. 51 (1915); Schelpé in F.Z. Pterid.: 179 (1970); in C.F.A. Pterid.: 142 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 354, t. 263 (1983). Type: Cape Province, ? near Grahamstown, *Hesse* s.n. (?LE, holo.).

Rhizome ascending, up to 5 mm in diameter, set with appressed, dark brown, narrowly ovate-deltate, pseudoserrate rhizome-scales up to 2 mm long with paler borders. *Fronde*s closely spaced, herbaceous, gemmiferous; *stipe* dark brown, densely scaly at first with appressed scales of different sizes, also with hairs; *lamina* very narrowly elliptic to ovate-lanceolate, up to 650 × 130 mm, pinnate to shallowly 2-pinnatifid, lower pinnae decrescent; *pinnae* in up to 55 pairs, base unequally cuneate, shallowly pinnatifid into linear-oblong, acute, usually 2- or 3-fid lobes or broadly cuneate and deeply incised lobes, set with minute, pale, hair-like scales below and along costa above; *rhachis* winged for most of its length, densely pubescent dorsally with pale hairs, and set with occasional ovate scales. *Sori* borne between costa and lobes, on outermost branch-vein supplying lobes, up to 8 mm long; *indusium* linear, membranous, entire, c. 0,4 mm broad. Fig. 55: 2.

Cape Province, Transkei, Natal, Transvaal, Zimbabwe, Mozambique, Malawi, Zambia, Angola, Zaire, Burundi, Tanzania, Kenya, Ethiopia, Sudan, Cameroun, Nigeria, Fernando Po, Madagascar, Mauritius. A lithophyte on mossy boulders in deep shade in forest, 650–2 000 m. Map 155.

Vouchers: *Braithwaite* 154 (BOL); *Compton* 14307 (NBG; PRE); *Fisher* 1010 (BLFU; NU; PRE); *MacOwan* 316 (BM; PRE; SAM).

8. *Asplenium friesiorum* C. Chr. in Notizbl. bot. Gart. Mus. Berl. 9: 181 (1924); Schelpé in F.Z. Pterid.: 178 (1970); in C.F.A. Pterid.: 142 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 353, t. 262 (1983). Type: Kenya, Mt Kenya, *R.E. & T.C.E. Fries* 573 (?B, holo.; K!; S-BOL, photo.).

*Tarachia friesiorum* (C. Chr.) Momose in J. Jap. Bot. 35: 321, figs 33, 34 (1960).

*Asplenium serra* var. *natalense* Bak. in Hook. & Bak., Syn. Fil. edn 2: 485 (1883), as *natalensis*. Type: Natal, *Buchanan* s.n.





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FIG. 58.—1, *Asplenium flexuosum*, part of frond,  $\times 0,6$  (Schelpe 5954). 2, *Asplenium adiantum-nigrum*, part of frond,  $\times 0,6$  (Esterhuysen 26259).



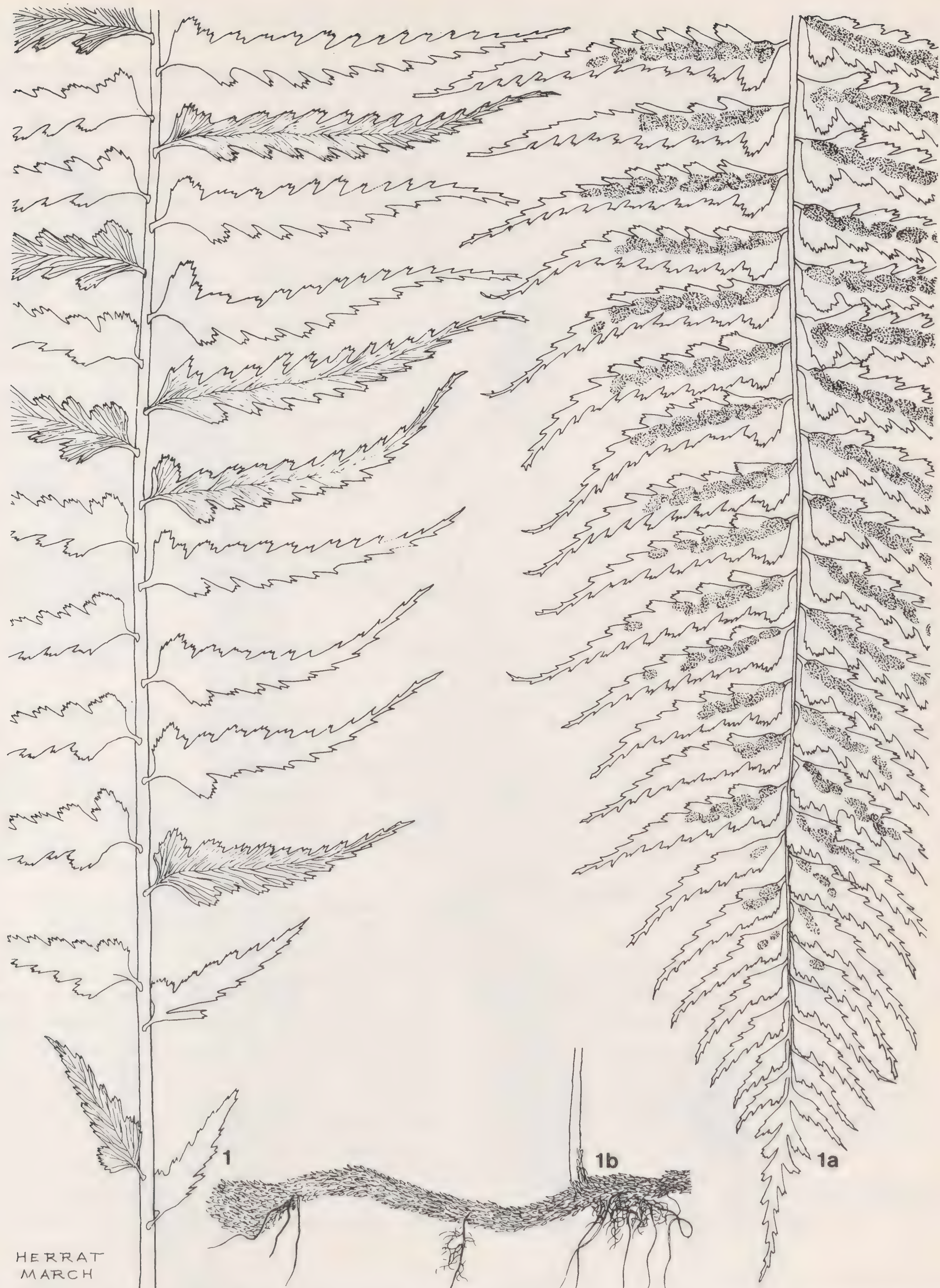
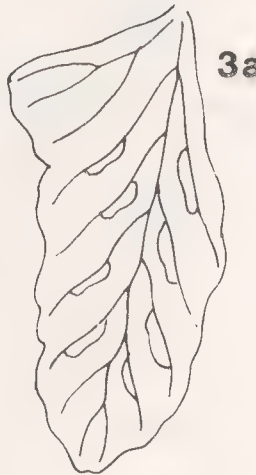
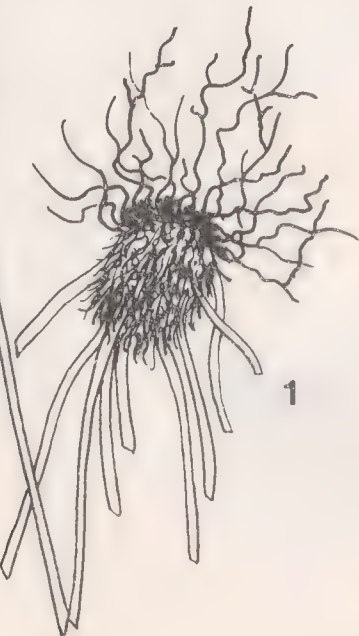
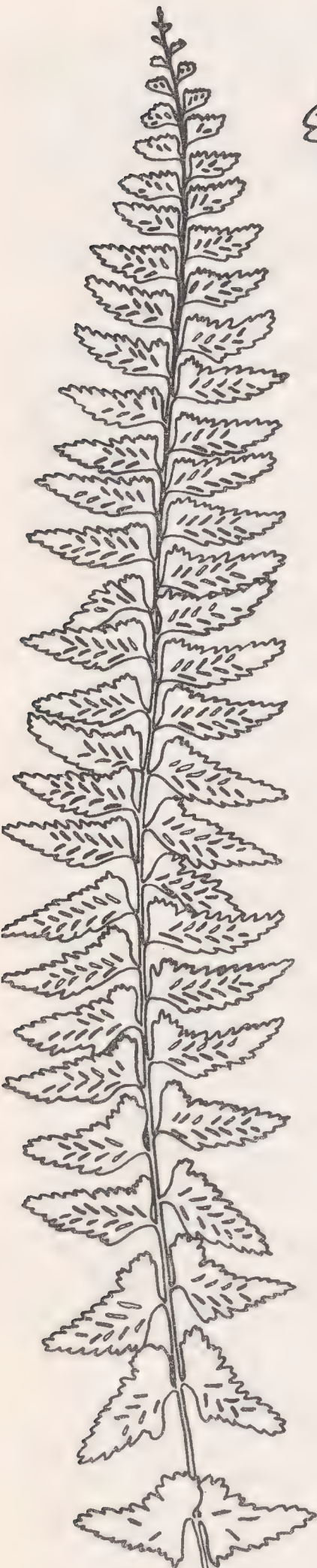


FIG. 59.—*Asplenium friesiorum*, 1, upper and 1a, lower parts of frond; 1b, part of rhizome, all  $\times 0,6$  (Schelpe 5430).





pure



*Asplenium serra* sensu Sim, Ferns S. Afr. edn 2: 153, t. 56 (1915).

*Asplenium monilisorum* Domin in Preslia 8: 7 (1927). Type: Natal, McKen & Buchanan 24 (K, holo.!).

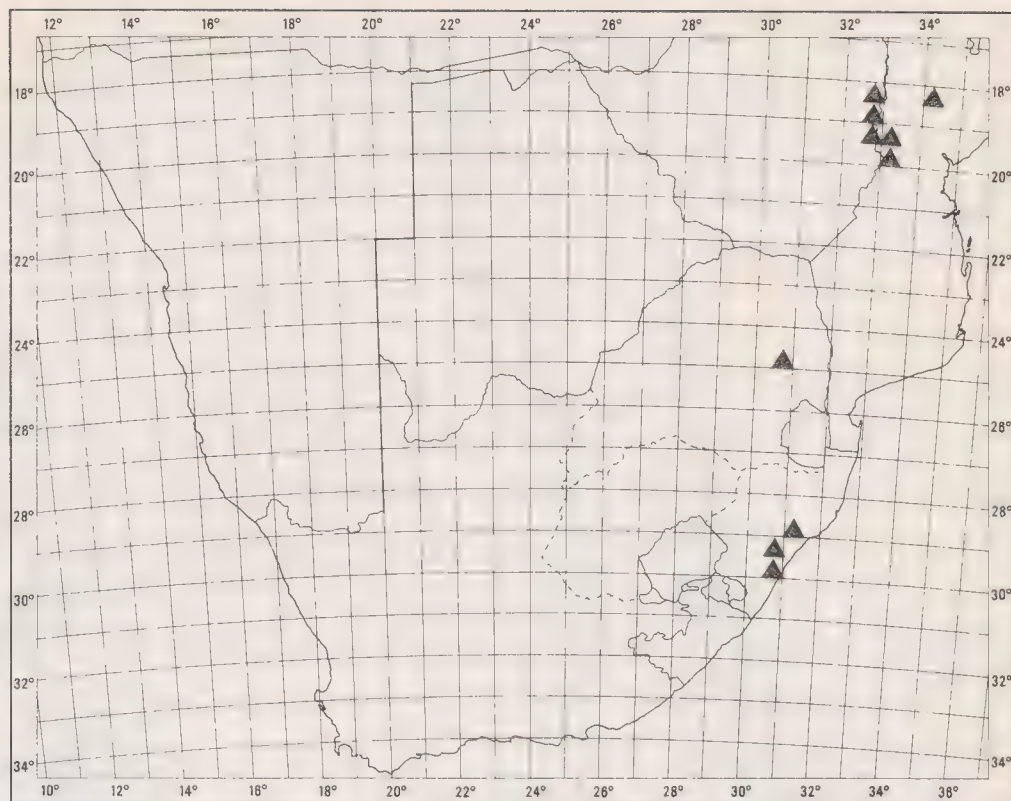
Rhizome widely creeping, up to 8 mm in diameter, set with nitid, brown, subentire to irregularly fimbriate, hair-pointed rhizome-scales c. 4 mm long. *Fronde*s widely spaced, thinly coriaceous, not gemmiferous; *stipe* dull, light to dark brown, set with scattered scales; *lamina* narrowly elliptic, acuminate, up to 800 × 260 mm, pinnate, basal pinnae reduced, apical segment deeply pinnatifid; *pinnae* in up to 35 pairs, linear-attenuate, base unequally cuneate and somewhat auriculate acroscopically, margin serrate to shallowly lobed with oblong serrate lobes, upper surface glabrous, lower surface set with scattered fimbriate scales. *Sori* borne in 2 rows closely set along costa, c. 5–10 mm long; *indusium* membranous, entire, c. 0,8 mm broad. Fig. 59.

Natal, Transvaal, Zimbabwe, Mozambique, Malawi, Zambia, Angola, Zaire, Tanzania, Kenya, Uganda, Sudan, Cameroun and Nigeria. Forest undergrowth, 1 300–2 600 m. Map 156.

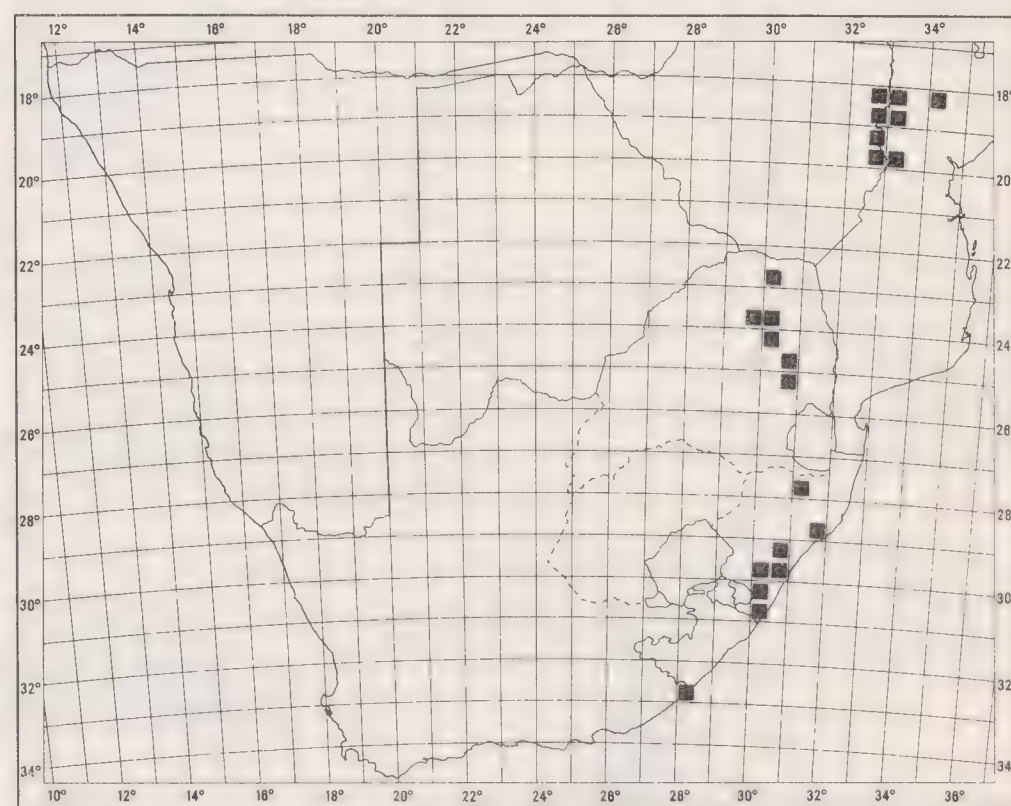
Vouchers: *Hardcastle* 67 (PRE); *Johnstone* 78 (NU); 117 (NU); *Schelpé* 1683 (BOL; NH; NU).

9. *Asplenium sandersonii* Hook., Sp. Fil. 3: 147, t. 179 (1860); Sim, Ferns S. Afr. edn 2: 139, t. 43 fig. 1 (1915); *Schelpé* in F.Z. Pterid.: 184, t. 53B (1970); in C.F.A. Pterid.: 145 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 371, t. 278 (1983). Type: Natal, ravine in Fields Hill, *Sanderson* s.n. (K, holo.!).

Rhizome erect, c. 3 mm in diameter, set with brown, lanceolate-attenuate, entire rhizome-scales c. 4 mm long. *Fronde*s tufted, thinly carnose-coriaceous, gemmiferous (bud borne at end of an extension of rhachis); *stipe* green when fresh, less than 1/2 lamina length, set with scattered scales with broadened fimbriate bases; *lamina* linear, c. 165 × 20 mm, pinnate, narrowly winging rhachis; *pinnae* in up to 32 pairs, rhombic-dimidiolate to cuneate tending to lunate, basal pinnae reduced, outer margin shallowly lobed into usually 4–6 (up to 9) entire, obtuse lobes, upper surface glabrous, lower surface set with substellate scales. *Sori*



MAP 156.—*Asplenium friesiorum*



MAP 157.—*Asplenium sandersonii*

oblong to semicircular, up to 5 per pinna, c. 2,5 mm long; *indusium* thinly membranous, lacerate, c. 1 mm broad. Fig. 60: 2.

Transkei, Natal, Transvaal, Zimbabwe, Mozambique, Malawi, Angola, Zaire, Tanzania, Kenya, Uganda, Sudan, Ethiopia, Madagascar, Mauritius, Comoro Islands and São Tomé. Common gregarious low-level epiphyte in moist forest, and occasionally found as a lithophyte on mossy boulders or on forest floors, 350–3 300 m. Map 157.

Vouchers: *Burrows* 1337 (BOL; NBG); *Johnstone* 615 (NU); *Pegler* 489 (PRE); *Schelpé* 1618 (NH; NU); *Schlechter* 4760 (BM; BOL; GRA; K; PRE).







10. *Asplenium stoloniferum* Bory in Voy. 1: 329 (1804); W. B. G. Jacobsen, Ferns Sthn Afr. 370, t. 18 (1983). Type: Réunion, Plaine de Chicots, Bory s.n. (P, holo.!, BM, iso.).

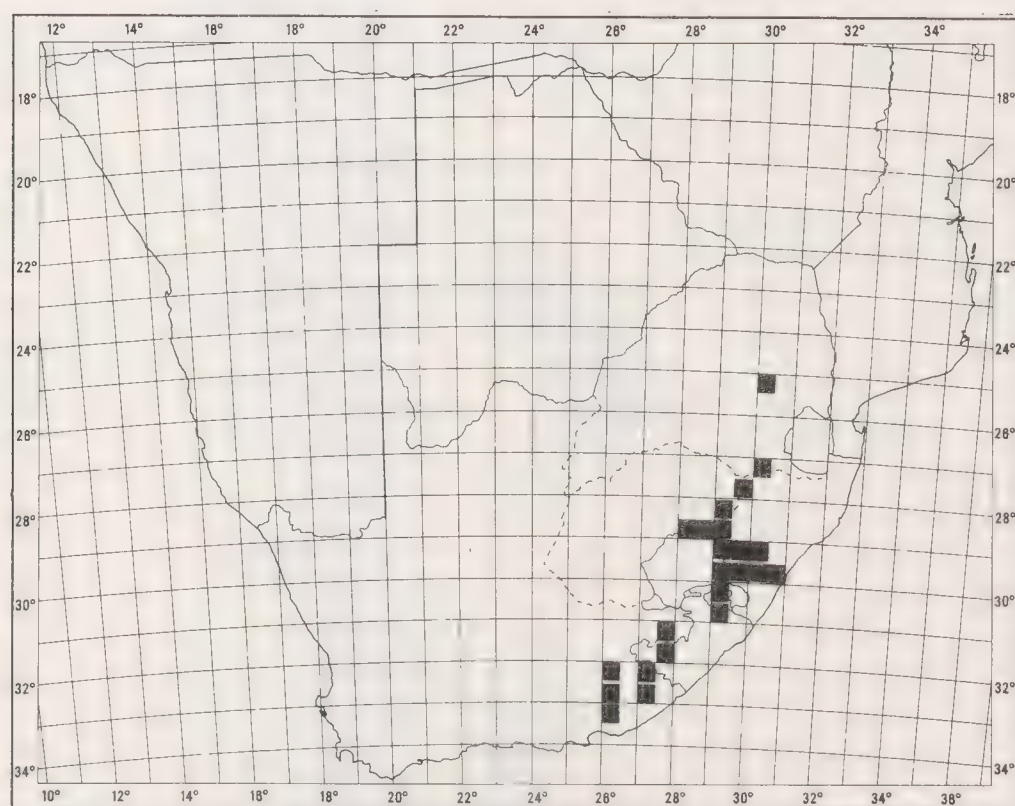
*Asplenium dentatum* Krauss ex Pappe & Raws., Syn. Fil. Afr. Austr. 17 (1858), non L. (1753); Krauss in Flora 1846: 131 (1846), nomen.

*Asplenium kraussii* T. Moore ex Hook., Sp. Fil. 3: 147, t. 180A (1860); Sim, Ferns S. Afr. edn 2: 138, t. 43 fig. 2 (1915). Type: Natal, Boschman's Rand, Krauss 25 (K, holo.!, BM!).

Rhizome erect, up to 3 mm in diameter, set with dark brown, lanceolate-acuminate, entire rhizome-scales c. 2 mm long. *Fronds* tufted, thinly herbaceous, not gemmiferous; *stipe* greenish, shorter than lamina, set with hair-like scales of different sizes; *lamina* linear, c. 120 × 16 mm, pinnate, lower pinnae decrescent; *pinnae* in up to 21 pairs, oblong to rhombic or deltate, base forming an angle of c. 90°, generally broader than long, outer margins sharply dentate, glabrous on both surfaces. *Sori* usually 2 or 3 per pinna, 2–3 mm long; *indusium* thinly membranous, entire to erose, c. 1 mm broad. Fig. 61: 3.

Cape Province, Transkei, Natal, Lesotho, Orange Free State, Transvaal and Réunion. Lithophytic and epiphytic in forest shade, c. 1 300–2 100 m altitude. Map 158.

Vouchers: *Acocks* 11526 (NH; PRE); *Dieterlen* 820a (PRE); *Pegler* 1637 (BM; BOL; K; PRE); *Schelpe* 1543 (BM; NH; NU); *Schlechter* 6846 (GRA; PRE).



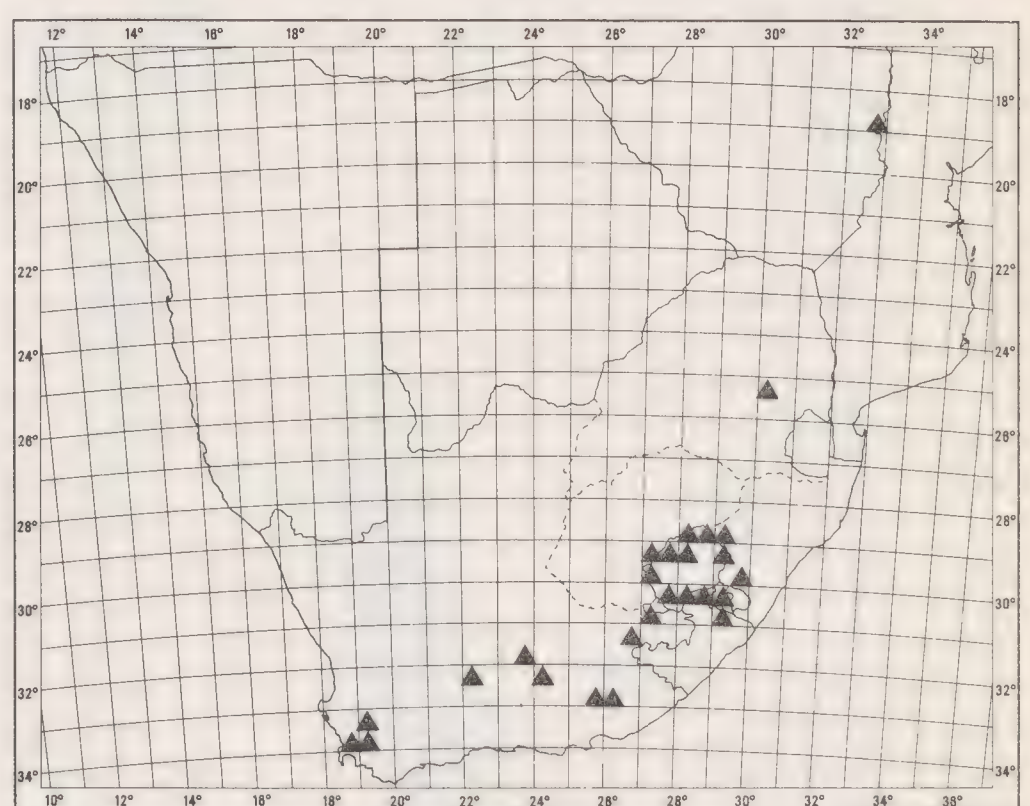
MAP 158.—*Asplenium stoloniferum*

11. *Asplenium trichomanes* L., Sp. Pl. 2: 1080 (1853); Sim, Ferns S. Afr. edn 2: 140, t. 44 fig. 1 (1915); Schelpe in F.Z. Pterid.: 174 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 341, t. 251 (1983). Type: Europe (LINN 1250/12, holo.!).

Rhizome erect, c. 2 mm in diameter, set with lanceolate, attenuate, minutely serrulate, dark brown rhizome-scales up to 4 mm long, often with paler reddish brown margins. *Fronds* tufted, firmly membranous, gemmiferous; *stipe* castaneous, usually less than  $\frac{1}{6}$  lamina length, glabrous; *lamina* narrowly linear, up to 150 × 15 mm, somewhat tapering basally, pinnate; *pinnae* in up to 32 pairs, broadly oblong-circular, the unequally cuneate base forming an angle of 90°, outer margin crenate to dentate, upper surface glabrous, lower surface set with scattered, minute, pale or dark, 1- or 2-celled scales. *Sori* 2 to 7 per pinna, c. 1.5 mm long; *indusium* yellowish membranous, erose, c. 0.3 mm broad. Fig. 61: 1.

Cape Province, Transkei, Natal, Lesotho, Orange Free State, Transvaal, Zimbabwe, Kenya, Ethiopia, Somalia, Socotra, Algeria, Morocco, Canary Islands, Azores, British Isles; North America as far south as Mexico (Knobloch & Correll, 1962), as well as Eurasia. Also Australia and New Zealand. Rock crevices and boulder bases, 1 200–3 300 m. Map 159.

Vouchers: *Bolus* 577 (BOL; NBG; PRE); *Dieterlen* 569 (PRE; SAM); *Esterhuysen* 26044 (B; BM; BOL; C; GH; M; MO; P; PR; PRE; S); *Hilliard & Burt* 10456 (NU); *Potts* 4769 (BLFU).



MAP 159.—*Asplenium trichomanes*

FIG. 61.—1, *Asplenium trichomanes*, part of plant, × 0.6; 1a, detail of lower surface of pinna, × 5.4 (*Esterhuysen* 26099a). 2, *Asplenium lobatum*, frond, × 0.6; 2a, detail of lower surface of ultimate segments, × 6 (*Sim* s.n.). 3, *Asplenium stoloniferum*, part of plant, × 0.6; 3a, detail of lower surface of pinnae, × 2.4 (*Buchanan* sub BOL 23496).







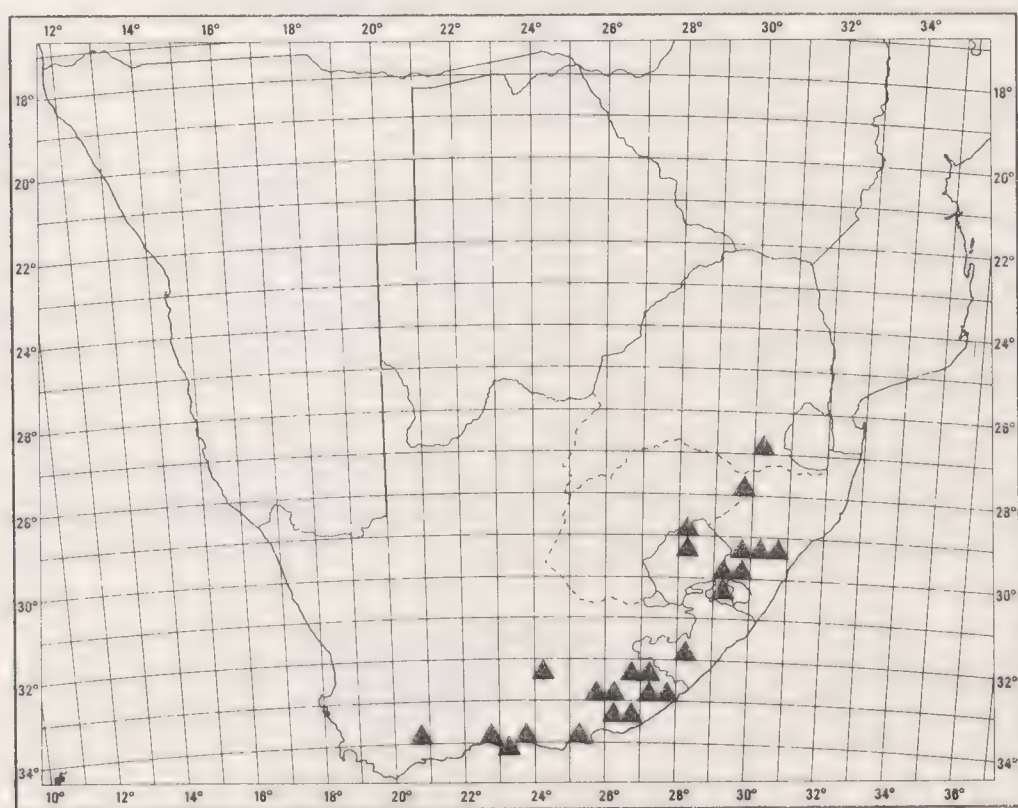
12. *Asplenium platyneuron* (L.) Oakes in Eaton, Ferns N. Amer. 1: 24 (1878); Sim, Ferns S. Afr. edn 2: 140, t. 45 fig. 1 (1915); W. B. G. Jacobsen, Ferns Sthn Afr. 343, t. 253 (1983). Type: North America, Virginia, Clayton s.n. (Holotype lost—BM, photo!).

*Acrostichum platyneuron* L., Sp. Pl. 2: 1069 (1753).

Rhizome erect to suberect, c. 4 mm in diameter, set with dark brown to black, lanceolate-attenuate, subentire rhizome-scales c. 3 mm long. *Fron*ds tufted, firmly membranous, not gemmiferous; *stipe* atrocastaneous, nitid, less than  $\frac{1}{6}$  lamina length, set at first with hair-like scales; *lamina* linear, c. 240 × 26 mm, pinnate, lower pinnae decrescent; *pinnae* in up to 50 pairs, subsessile, set at 90° or more to rhachis; *midpinnae* linear to oblong or lanceolate, auriculate acroscopically, base cordate, overlapping rhachis, margin somewhat irregularly crenate-serrate, incisions sometimes alternating deeper and shallower, upper surface glabrous, lower surface set with minute pale or dark-tipped scales; *venation* obscure. *Sori* up to 18 per pinna, c. 2 mm long; *indusium* membranous, erose, c. 0,5 mm broad. Fig. 62: 3.

Cape Province, Transkei, Natal, Lesotho and Transvaal. Also North America and Jamaica (Christensen, 1905). Forest floors, streambanks and shady ledges, 1 200–2 200 m. Map 160.

Vouchers: Killick 833 (NU; PRE); Pott 4860 (BOL; PRE); Schelpe 6558 (B; BOL; C; K; M; MO; P; PR; PRE; S).



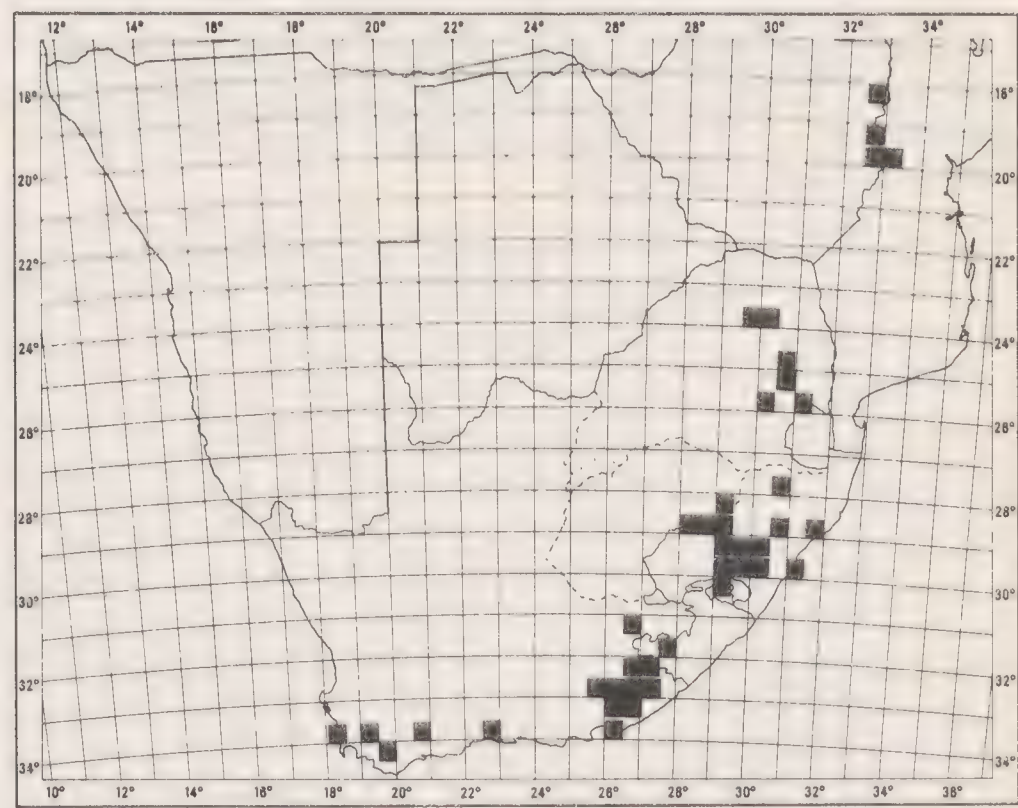
MAP 160.—*Asplenium platyneuron*

13. *Asplenium monanthes* L., Mant. 1: 130 (Oct. 1767); Sim, Ferns S. Afr. edn 2: 141, t. 46 fig. 1 (1915); Schelpe in F.Z. Pterid.: 175, t. 53D (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 342, t. 252 (1983). Type: Cape of Good Hope (LINN 1250/17, holo!).

*Asplenium monanthemum* L., Syst. Nat. edn 12, 2: 690 (Oct. 1767). Type as above.

Rhizome erect to suberect, c. 3 mm in diameter, set with black, lanceolate-attenuate, hair-pointed rhizome-scales c. 4 mm long, with reddish-brown subentire borders. *Fron*ds tufted, firmly membranous, rarely gemmiferous on *stipe*; *stipe* atrocastaneous, shorter than lamina, nitid, set at first with attenuate sinuose scales, persistent basally; *lamina* linear, acute, somewhat decrescent, up to 300 × 25 mm, pinnate; *pinnae* in up to 45 pairs, oblong-falcate, becoming broadly cuneate-flabellate basally, outer margins prominently crenate-dentate, upper surface glabrous, lower surface, with occasional 1- or 2-celled scales. *Sori* usually solitary on each pinna (occasionally 2), c. 2 mm long, set on vein nearest to and running parallel to basispic margin; *indusium* membranous, subentire, c. 0,6 mm broad. Fig. 62: 1.

Cape Province, Transkei, Natal, Lesotho, Orange Free State, Transvaal, Zimbabwe, Malawi, Tanzania, Kenya, Sudan; Fernando Po, Madeira, Madagascar, Réunion, Tristan da Cunha and Gough Island. Also America, from Mexico to Bolivia and Chile, Jamaica and Hawaii (Christensen, 1905, 1913). Shaded forest floors and gullies, 1 400–2 500 m. Map 161.



MAP 161.—*Asplenium monanthes*

FIG. 62.—1, *Asplenium monanthes*, frond, × 0,6; 1a, detail of lower surface of pinna, × 6 (Whellan 1509). 2, *Asplenium erectum* var. *usambarense*, part of plant, × 0,6; 2a, detail of lower surface of upper pinna, × 6 (Schelpe 5586). 3, *Asplenium platyneuron*, part of plant, × 0,6 (Schelpe s.n.).



Vouchers: *Dieterlen* 710 (PRE); *Flanagan* 1678 (BOL; PRE; SAM); *Johnstone* 282 (BM; NU); *Leendertz* 851 (BOL; GRA; PRE); *Whellan* 1509 (BOL; SRGH).

14. *Asplenium lunulatum* Swartz in J. Bot. Gött. 1800, 2: 52 (1801); Sim, Ferns S. Afr. edn 2: 144, t. 47 (1915); W. B. G. Jacobsen, Ferns Sthn Afr. 344, t. 254 (1983). Type: Cape Province, *Thunberg* s.n. (UPS, holo.).

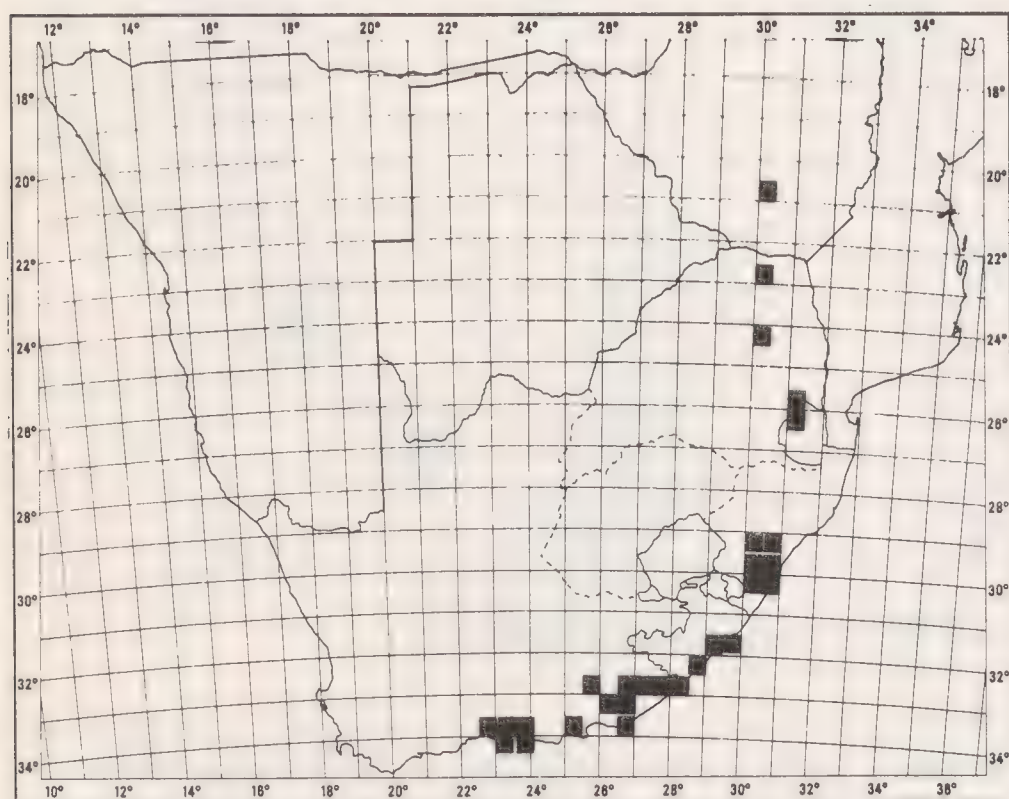
*Asplenium erectum* var. *lunulatum* (Swartz) Sim, Kaffrarian Ferns 40, t. 32 (1891).

*Asplenium falcatum* Thunb., Prodr. 172 (1800), non Lam. (1786), nec Retz. (1791).

*Asplenium erectum* var. *minor* Sim, Kaffrarian Ferns 40, t. 31 fig. 2 (1891). *Asplenium lunulatum* var. *minor* (Sim) Sim, Ferns S. Afr. edn 2: 144, t. 45 fig. 2 (1915). Type: Cape Province, Dohne Hill, *Sim* s.n. (PRE, holo.).

Rhizome erect, c. 4 mm in diameter, set with dark brown to black, lanceolate-acuminate, entire rhizome-scales c. 3,5 mm long. *Fronds* tufted, thinly herbaceous, gemmiferous; *stipe* grey-green, shorter than lamina, glabrous at maturity; *lamina* narrowly linear-lanceolate, c. 300 × 30 mm, pinnate, basal pinnae gradually decrescent; *pinnae* in up to 45 pairs, oblong-obtuse, falcate, base forming an angle of 90° and auriculate acroscopically to a greater or lesser degree, basispic margin perpendicular to rhachis, margin regularly crenate-serrate, upper surface glabrous, lower surface set with occasional minute, light brown, hair-like scales. *Sori* borne midway along unforked veins, c. 2 mm long; *indusium* membranous, ovate-oblong, entire, c. 0,5 mm broad. Fig. 60: 3.

Cape Province, Transkei, Natal and Transvaal, Zimbabwe and Malawi. A forest species, sporadic in deep shade on humus-covered boulders and forest floors, from 25 to 1 200 m altitude. Map 162.



MAP 162.—*Asplenium lunulatum*

Vouchers: *Rudatis* 1033 (BM; PRE; S); *Smook* 626 (NU); *Strey* 8983 (BOL; NH; NU); *Thorncroft* 10 (PRE).

15. *Asplenium erectum* Bory ex Willd. in L., Sp. Pl. edn 4, 5: 328 (1810); W. B. G. Jacobsen, Ferns Sthn Afr. 345, t. 4, 255 (1983). Type: Réunion, *Bory* s.n., Herb. Willdenow no. 19906 (B, lecto.).

Rhizome erect, c. 3 mm in diameter, set with dark brown, lanceolate, acuminate, subentire rhizome-scales c. 5 mm long. *Fronds* tufted, firmly membranous, not gemmiferous; *stipe* castaneous, usually less than ¼ lamina length, with narrow green wings in upper half and sparsely scaly at first; *lamina* narrowly elliptic, up to 400 × 55 mm, pinnate to 2-pinnatifid, winging rhachis, lower pinnae decrescent; *pinnae* in up to 40 pairs, somewhat falcate, acroscopic basal lobe separated to a greater or lesser extent, base unequally cuneate, margin deeply serrate, serrations single or paired, glabrous. *Sori* up to 15 per pinna, extending from near costa ⅓–⅔ to margin; *indusium* membranous, entire to erose, c. 0,3 mm broad. Fig. 60: 1; 62: 2.

Lamina narrowly elliptic; basal auricle of lower pinnae not free..... (a). var. *erectum*  
Lamina linear-elliptic; basal auricle of lower pinnae free ..... (b). var. *usambarense*

#### 15(a). var. *erectum*.

Schelppe in F.Z. Pterid.: 175 (1970).

*Asplenium lunulatum* var. *erectum* (Bory ex Willd.) Sim, Ferns S. Afr. edn 2: 145, t. 47c, t. 48 (1915).

*Asplenium mutilatum* Kaulf., Enum. Fil. 171 (1824). Type: Cape Peninsula (?HAL, holo.).

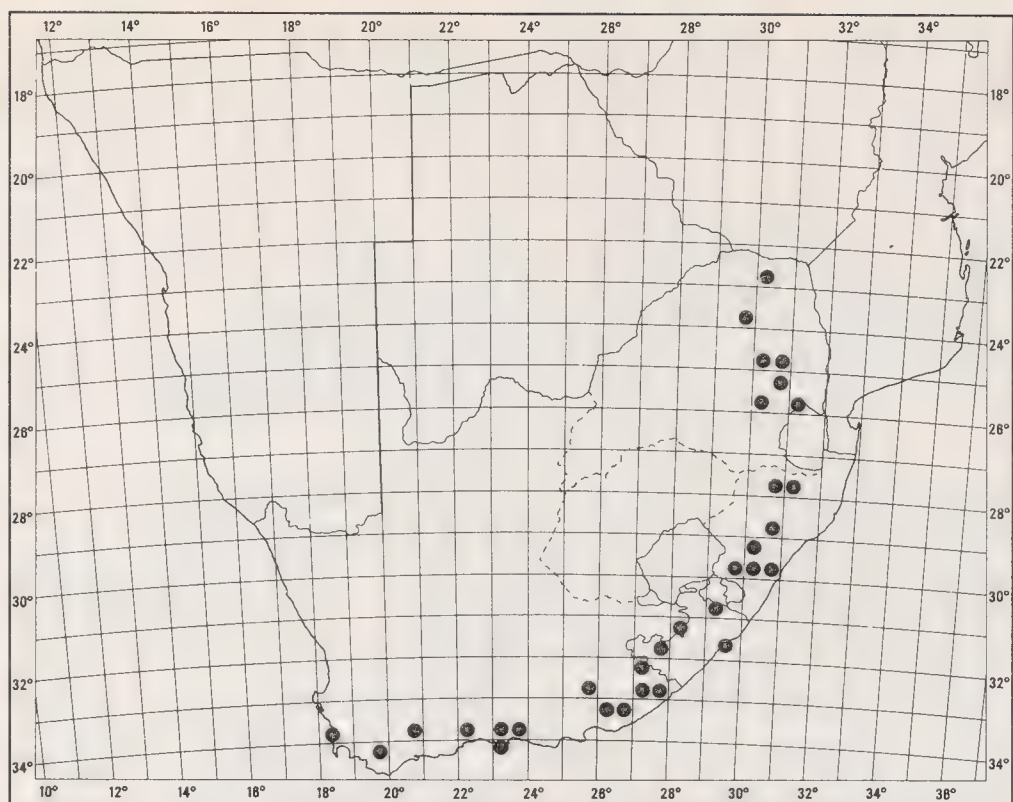
Cape Province, Natal, Transvaal, Mozambique, Malawi, Zaire, Tanzania, Kenya, Uganda, Sudan, Comoro Islands, Réunion, Mauritius, Gough Island and Tristan da Cunha. Forest floors in shade, but occasionally an epiphyte in very wet forest, 280–1 600 m and 2 600 m in tropical Africa. Map 163.

Vouchers: *Fisher* 788 (BM; NH; PRE); *Schelppe* 5020 (B; BOL; C; K; M; MO; P; PR; PRE; S); 6059 (BM; BOL; PRE); *Schirach* 282 (BOL; NBG).

15(b). var. *usambarense* (Hieron.) Schelppe in Bolm Soc. broteriana, sér. 2, 41: 207 (1967); in F.Z. Pterid.: 176, t. 53F (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 347 (1983). Type: Uganda, Butagu Valley, *Mildbraed* 2713 (B, holo.).

*Asplenium sphenolobium* var. *usambarense* Hieron. in Wiss. Ergebn. dt. ZentAfr.-Exped. 2: 14 (1911). *Asplenium usambarense* (Hieron.) Hieron. in Hedwigia 60: 227 (1918), nom. illeg.





MAP 163.—*Asplenium erectum* var. *erectum*

*Asplenium zeyheri* Pappe & Raws., Syn. Fil. Afr. Austr. 18 (1858); W. B. G. Jacobsen, Ferns Sthn Afr 348, t. 257 (1983). *Asplenium erectum* var. *zeyheri* (Pappe & Raws.) T. Moore, Ind. Fil. 127 (1859). *Asplenium lunulatum* var. *zeyheri* (Pappe & Raws.) Sim, Ferns S. Afr. edn 1: 139, t. 67c (1892); edn 2: 145, t. 49c (1915). Syntypes: Cape Province, Uitenhage, *Rubidge* s.n. (?BM); near Philipstown, Kat River, *Ecklon & Zeyher* s.n. (?BM).

Natal, Transvaal, Zimbabwe, Mozambique, Malawi, Zaire, Tanzania, Kenya, Ethiopia, Sudan, Cameroun, Nigeria, São Tomé and Fernando Po, as well as Sri Lanka and India. Shaded forest floors, c. 1 000–1 750 m. Map 164.

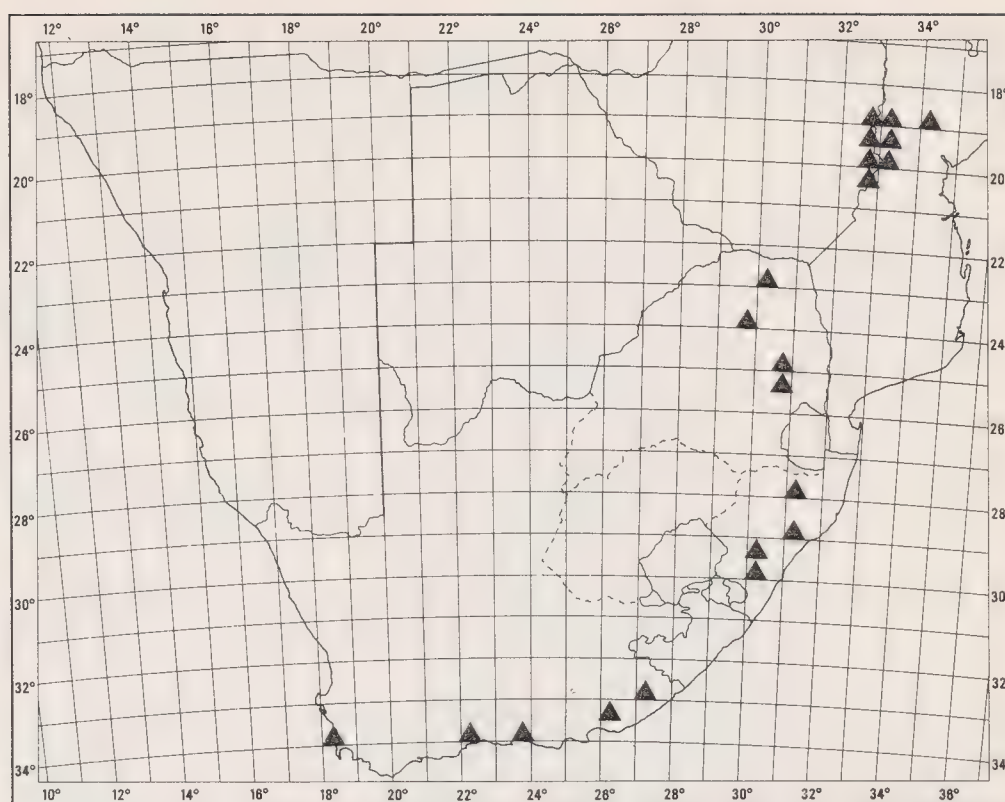
Vouchers: *Braithwaite* 148 (BOL); 169 (BOL); 233 (BOL); *Codd & De Winter* 147 (PRE); *Ward* 448; (NPB; NU).

16. *Asplenium inaequilaterale* Willd. in L., Sp. Pl. edn 4, 5: 322 (1810); Schelpe in F.Z. Pterid.: 176, t. 53C (1970); in C.F.A. Pterid.: 139 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 347, t. 246 (1983). Type: Réunion, *Bory* s.n., Herb. Willdenow no. 19896 (B, holo.!).

*Asplenium brachyotus* Kunze in Linnaea 10: 512 (1836). *Asplenium erectum* var. *brachyotus* (Kunze) Sim, Ferns S. Afr. edn 1: 138, t. 66 (1892). *Asplenium laetum* var. *brachyotus* (Kunze) Bonap., Not. Pterid. 16: 60 (1925). Type: Transkei, between the Umsikaba and Umzimvubu Rivers, *Drège* s.n. (LZ, holo.†; BM!).

*Asplenium laetum* sensu Sim, Ferns S. Afr. edn 2: 150, t. 50 (1915), non Swartz (1806).

Rhizome erect, up to 4 mm in diameter, set with dark brown, entire, lanceolate-attenuate rhizome-scales c. 2,5 mm long. *Fronde* tufted, firmly membranous, not gemmiferous; *stipe* greenish brown, subglabrous at maturity; *lamina* narrowly oblong-acuminate, up to 320

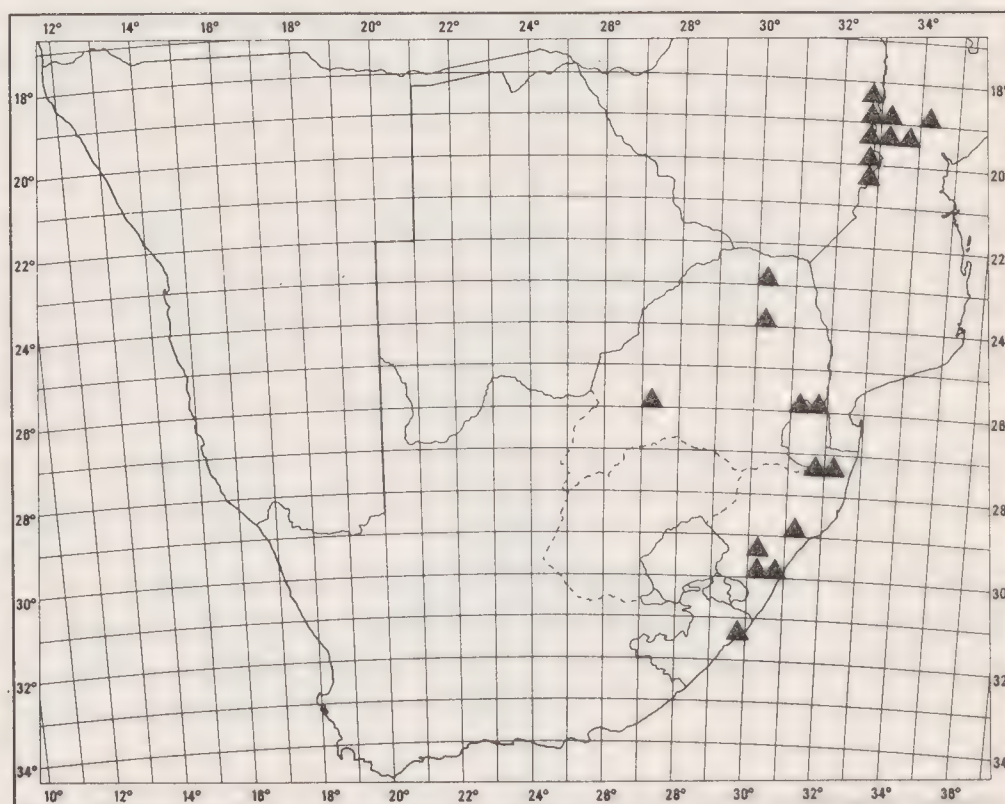


MAP 164.—*Asplenium erectum* var. *usambarense*

× 130 mm, winging rhachis, pinnate, lower pinnae not decrescent; *pinnae* in 12–20 pairs, narrowly oblong, obtuse to attenuate, base unequally cuneate, crenate-serrate, crenations emarginate, upper surface glabrous, lower surface set with scattered minute scales; *apical segment* crenate-serrate. *Sori* borne on outermost branch-vein of a fork, midway between costa and margin, c. 4 mm long; *indusium* membranous, entire, c. 0,8 mm long. Fig. 63:1.

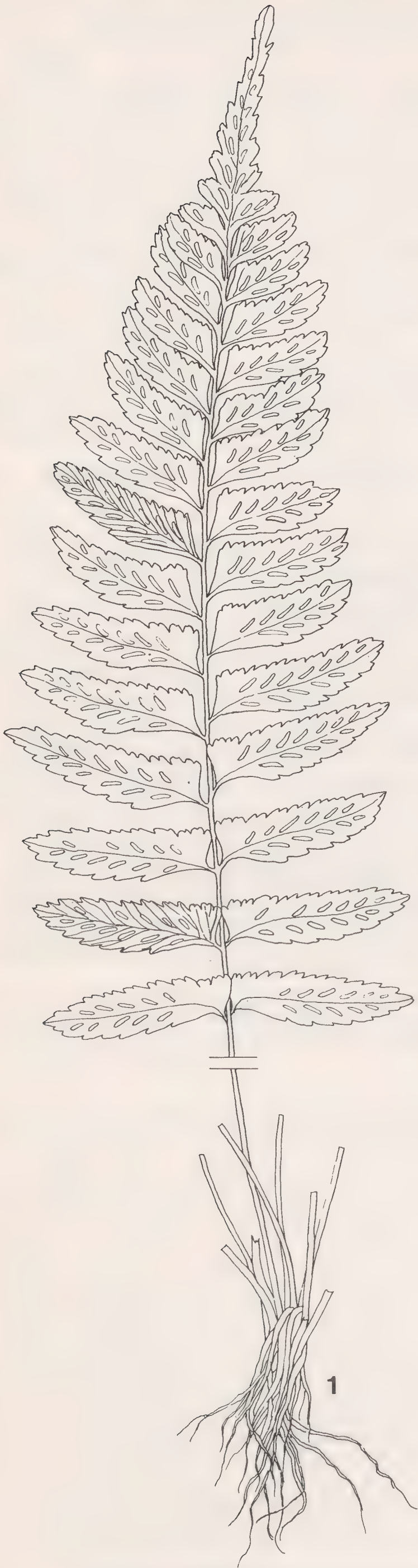
Transkei, Natal, Swaziland, Transvaal, Zimbabwe, Mozambique, Malawi, Zambia, Angola, Zaire, Tanzania, Kenya, Uganda, Sudan, Ethiopia, Gabon, Cameroun, Togo, Ghana, Liberia, Fernando Po, São Tomé, Réunion and Comoro Islands. On forest floors and streambanks in dense shade, 25–1 400 m. Map 165.

Vouchers: *Fisher* 1007 (BOL; NU; PRE); *Pegler* 963 (BOL; PRE); *Schelpe* 5042 (BOL).



MAP 165.—*Asplenium inaequilaterale*





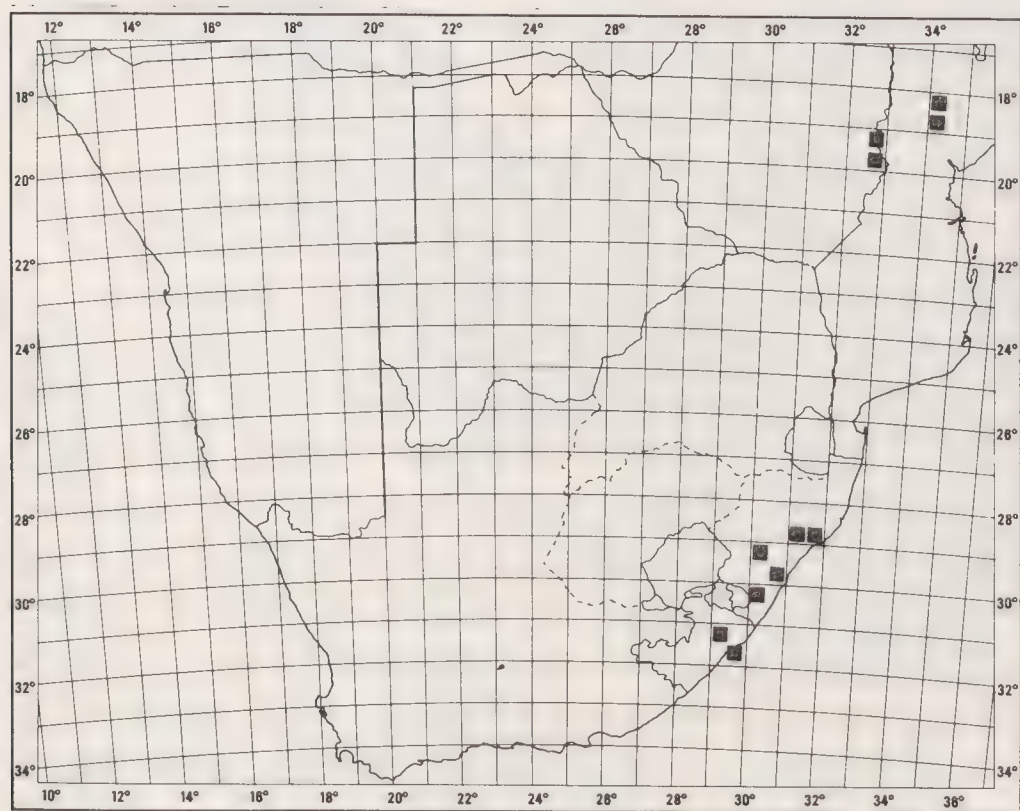
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17. *Asplenium dregeanum* Kunze in Linnaea 10: 517 (1836); Sim, Ferns S. Afr. edn 2: 166, t. 67 (1915); Schelpe in F.Z. Pterid.: 184 (1970); in C.F.A. Pterid.: 146 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 372, t. 279 (1983). Type: Transkei, between the Umsikaba and Umzimvubu Rivers, *Drège* 158 (LZ, holo.†; BM, lecto.†; HBG-BOL, photo.†; P).

Rhizome erect, c. 3 mm in diameter, set with dark brown, entire, lanceolate rhizome-scales c. 3 mm long, with narrow, pale ferruginous margins. *Fronde*s tufted, firmly membranous, gemmiferous; *stipe* greenish brown, with narrow green wings when fresh, usually less than  $\frac{1}{3}$  lamina length, set with occasional scales; *lamina* linear-lanceolate to narrowly oblong-elliptic, up to  $390 \times 60$  mm, base not gradually decrescent, deeply 2- to 3-pinnatifid; *pinnae* in up to 32 pairs, trapeziform, base unequally cuneate, acroscopic basal lobe 2- to 4-fid, other segments very narrowly oblong-obtuse (although second acroscopic segment sometimes bifid), upper surface set with occasional substellate scales, lower surface set with scattered substellate scales. *Sori* one per lobe, c. 2 mm long; *indusium* membranous, entire, c. 0,8 mm broad.

Transkei, Natal, Zimbabwe, Mozambique, Malawi, Zambia, Angola, Zaire, Tanzania, Uganda, Kenya, Sudan, Cameroun, Nigeria, Togo, Ghana, Ivory Coast, Liberia, Sierra Leone, São Tomé, Fernando Po, Comoro Islands and Madagascar. A forest species usually occurring in masses on boulders in deep shade, but occasionally found as a low-level epiphyte, between 25 and 1 700 m in Southern Africa. Map 166.



MAP 166.—*Asplenium dregeanum*

Vouchers: *Hardcastle* 265 (NU; PRE); *Medley Wood* s.n. (NH; PRE; SAM); *Schelpe* 5041 (B; BM; BOL; GH; K; M; MO; P; PRE; S; US).

18. *Asplenium preussii* Hieron. ex Brause in Wiss. Ergebn. dt. ZentAfr.-Exped. 2: 9, t. 1D (1910). Type: Cameroun, Mt Cameroun, Bovea, *Preuss* 584 (B, holo.).

*Asplenium auriculatum* sensu Sim, Ferns S. Afr. edn 2: 167, t. 68 (1915).

*Asplenium thunbergii* sensu Alston & Schelpe in JI S. Afr. Bot. 17: 161 (1952), non Kunze (1836).

*Asplenium pseudoauriculatum* Schelpe in Bolm Soc. broteriana, sér. 2, 41: 206 (1967); in F.Z. Pterid.: 185, t. 54B (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 373 (1983). Type: Mozambique, Manica & Sofala, Garuso, Jaegersberg, *Schelpe* 5626 (BOL, holo.†; BM!).

*Asplenium preussii* subsp. *austroafricanum* Schelpe in Bolm Soc. broteriana, sér. 2, 41: 208 (1967); W. B. G. Jacobsen, Ferns Sthn Afr. 373, t. 280 (1983). Type: Natal, Nkandhla Forest, *Schelpe* 1688 (BOL, holo.†).

Rhizome erect, c. 7 mm in diameter, set with dark brown, narrowly ovate-lanceolate, acuminate, entire rhizome-scales c. 4 mm long with narrow paler margins. *Fronde*s tufted, herbaceous, gemmiferous; *stipe* greenish, subglabrous at maturity except for somewhat fimbriate scales of different sizes basally; *lamina* lanceolate to narrowly elliptic attenuate, c.  $250 \times 85$  mm, base reduced but not gradually decrescent, pinnate to deeply 2-pinnatifid, basal acroscopic lobe of each pinna further divided; *pinnae* in c. 18 pairs, lanceolate, falcate, basal acroscopic lobe much-developed, other lobes oblanceolate to very narrowly obovate, 1- or 2-fid (occasionally up to 4-fid), each bearing a single sorus, upper surface glabrous, lower surface set with minute substellate and larger fimbriate scales. *Sori* c. 4 mm long; *indusium* membranous, subentire, c. 0,75 mm broad. Fig. 63: 2.

Natal, Transvaal, Zimbabwe, Mozambique, Malawi, Zaire, Kenya, Cameroun, Nigeria, Sierra Leone, Guinea and Fernando Po. Uncommon in deep forest shade, terrestrial, lithophytic on mossy boulders or a low-level epiphyte, 1 090–1 800 m. Map 167.

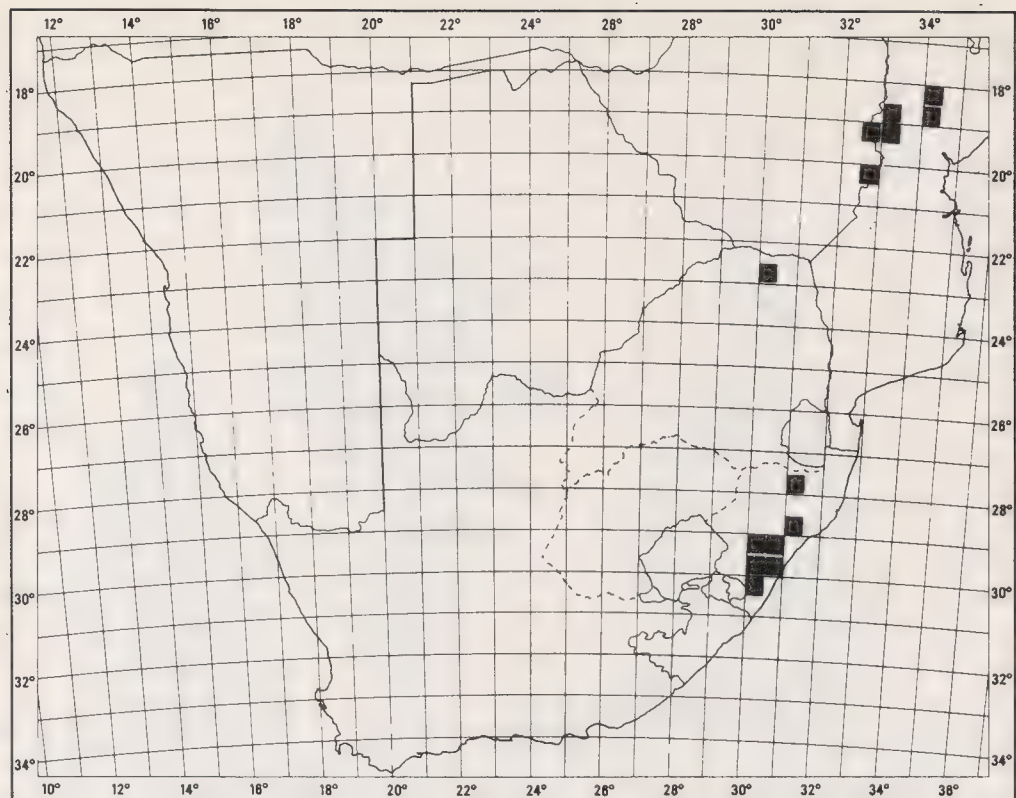
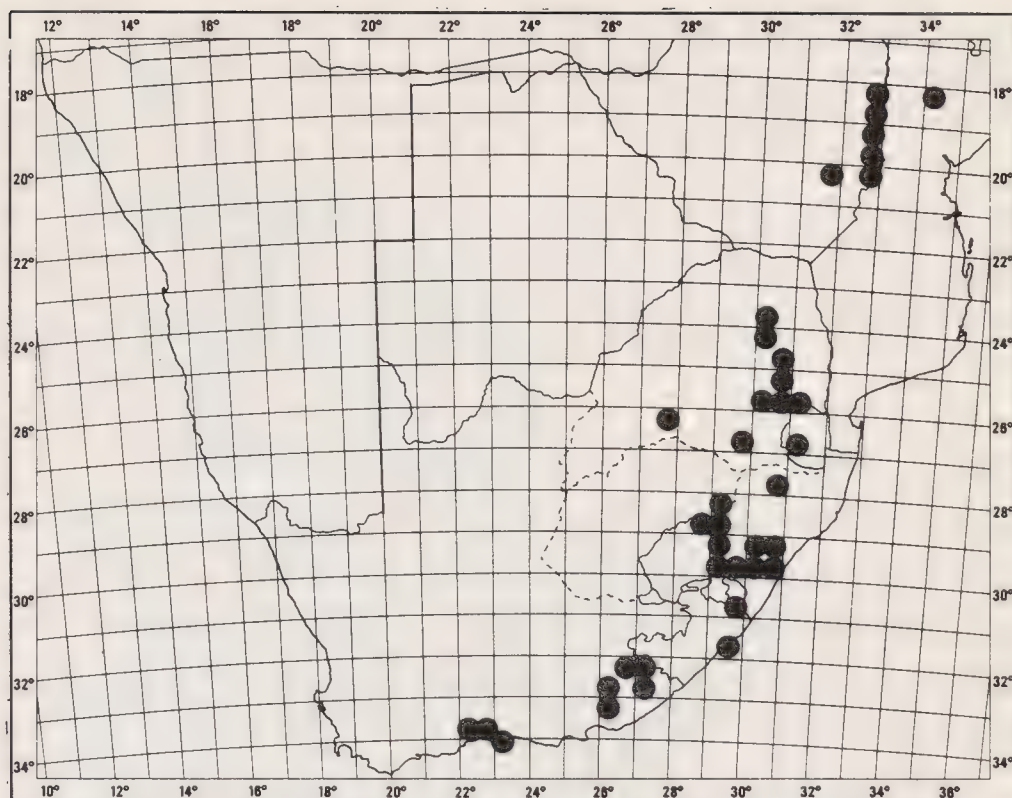
Vouchers: *Fisher* 692 (NH; NU); *Medley Wood* (GRA; PRE; SAM); *Rudatis* 1097 (BM; S).

With the availability of a larger and wider range of material, apparent intergradation between the Southern and tropical African plants has led to the treatment of the complex as a single variable species.







MAP 167.—*Asplenium preussii*MAP 168.—*Asplenium theciferum* var. *concinnum*

19. *Asplenium theciferum* (H.B.K.) Mett. in Ann. Sci. Nat., sér. 5, 2: 227 (1864). Type: Venezuela, *Humboldt & Bonpland* s.n.

Var. *concinnum* (Schrad.) Schelpe in Bolm Soc. broteriana, sér. 2, 41: 210 (1932); in F.Z. Pterid.: 188, t. 54D (1970); in C.F.A. Pterid.: 148 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 378, t. 284 (1983). Type: Cape Province, ? near Grahamstown, *Hesse* s.n. (?LE, holo.).

*Davallia concinna* Schrad. in Gött. Gel. Anz. 1818: 918 (1818). *Loxoscaphe concinnum* (Schrad.) T. Moore in J. Bot., Lond. 5: 227 (1853). *Asplenium concinnum* (Schrad.) Kuhn, Fil. Afr. 99 (1868). *Loxoscaphe theciferum* var. *concinnum* (Schrad.) C. Chr. in Dansk. bot. Ark. 7: 104 (1932).

*Davallia campyloptera* Kunze in Linnaea 10: 544 (1836). Type: Cape Province, near Plettenberg Bay, *Drège* s.n. (LZ, holo. †).

*Asplenium theciferum* sensu Sim, Ferns S. Afr. edn 2: 171, t. 72 (1915).

Rhizome erect, c. 5 mm in diameter, set with lanceolate, attenuate, irregularly ciliate-fimbriate, dark brown rhizome-scales c. 4 mm long with paler margins. *Fronde* tufted, car-nose-coriaceous, not gemmiferous; *stipe* green, set with scattered fimbriate scales; *lamina* narrowly ovate-lanceolate to narrowly elliptic, acute, up to 180 × 45 mm, deeply 2-pinnatifid to 3-pinnatifid, winging rhachis and most of stipe, basal pinnae hardly reduced; *pinnae* in c. 10 pairs, oblong to trapeziform, deeply divided

into obliquely spathulate lobes, basal acroscopic lobe usually bifid, upper surface glabrous, lower surface set with occasional fimbriate scales up to 1 mm long; *venation* obscure. *Sori* cupuliform, one borne terminally on each lobe, up to 2 mm long, acentric (subtended on one side by a triangle of lamina); *indusium* membranous, entire, c. 1 mm broad. Fig. 64: 2.

Cape Province, Transkei, Natal, Swaziland, Transvaal, Zimbabwe, Mozambique, Malawi, Angola, Zambia, Zaire, Kenya and Tanzania. Occasional low- to mid-level epiphyte or lithophyte, in forest, 850–2 300 m. Map 168.

Vouchers: *Braithwaite* 177 (BOL); *Moll & Morris* 676 (NU); *Schlechter* 7000 (BM; GRA; PRE); *Tyson* 1777 (BOL; PRE; SAM).

The typical variety of *A. theciferum* from tropical South America has a 'horn' of tissue, subtending the sorus, which is usually much longer than in the Southern African specimens; it also occurs occasionally in tropical Africa.

20. *Asplenium rutifolium* (Berg.) Kunze in Linnaea 10: 521 (1836); W. B. G. Jacobsen, Ferns Sthn Afr. 374, t. 281 (1983). Type: Cape of Good Hope, *Thunberg* s.n. (SBT, holo.!).

*Caenopteris rutifolium* Berg. in Acta Petropol. 1782, 2: 249, t. 7 fig. 2 (1786).

*Adiantum achilleifolium* Lam., Encycl. 1: 43 (1783). *Asplenium achilleifolium* (Lam.) C. Chr., Ind. Fil. 99 (1905), non Liebm. (1849). Type: Cape of Good Hope (P, holo.).

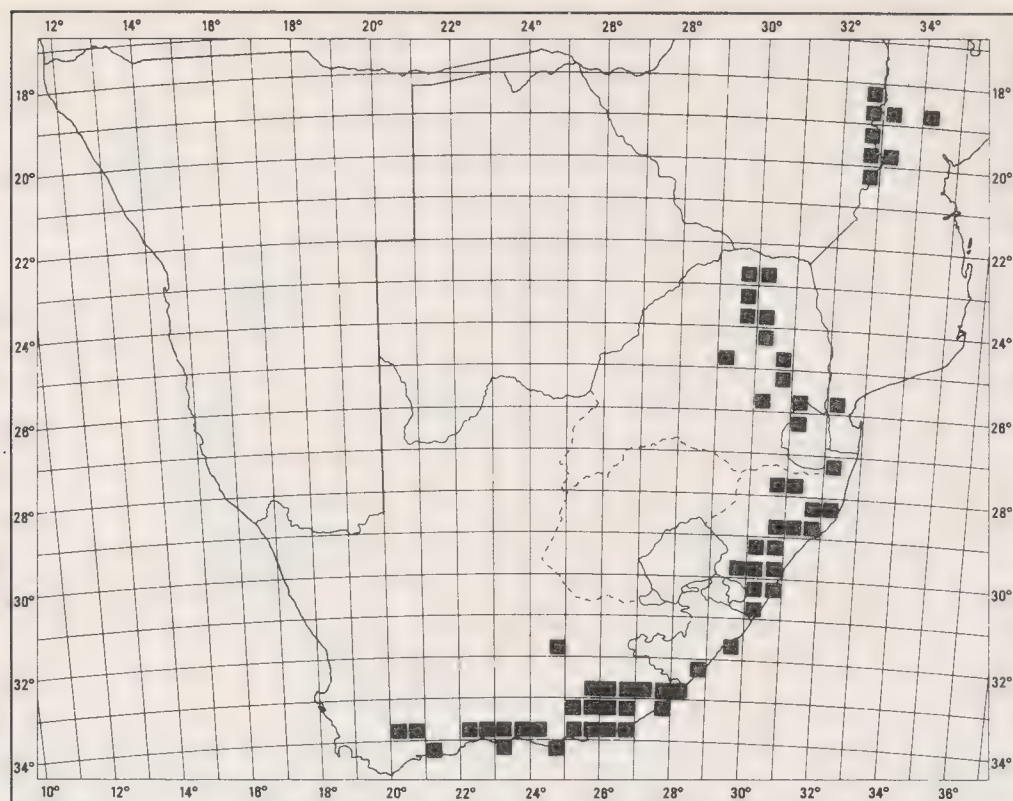
*Asplenium bipinnatum* sensu Sim, Ferns S. Afr. edn 2: 169, t. 71 (1915), non (Forssk.) C. Chr. (1910).





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MAP 169.—*Asplenium rutifolium*

Rhizome erect, c. 6 mm in diameter, set with lanceolate, dark brown, somewhat fimbriate, attenuate rhizome-scales up to 4 mm long with paler borders. *Fronds* tufted, thinly to thickly coriaceous, not gemmiferous; *stipe* greenish to pale brown when dry, becoming glabrous at maturity; *lamina* narrowly elliptic-acute, up to  $450 \times 130$  mm, deeply 3- to 4-pinnatifid; *pinnae* in up to 19 pairs, unequally deltate to lanceolate, progressively more divided from apex to base, base unequally cuneate, acroscopic margin more developed; *ultimate lobes* oblanceolate to oblong to obovate, acute, upper surface glabrous, lower surface set with occasional scales c. 1 mm long. *Sori* one per lobe, borne halfway along length of lobe or more towards apex, c. 2 mm long; *indusium* membranous, entire, extending from costa almost to margin, c. 0,4 mm broad. Fig. 65: 1.

Cape Province, Transkei, Natal, Swaziland, Transvaal, Zimbabwe, Mozambique, Tanzania and Kenya. Frequent low-level epiphyte in streambank forest, and occasionally terrestrial or lithophytic, 30–1 700 m. Map 169.

Vouchers: Clarkson 258 (BM; BOL; NU); Fisher 801 (NH; NU; PRE); Schelpe 5969 (BM; BOL; PRE); Schlechter 1801 (J; NBG; PRE); Ward 2117 (BOL; MO; NU).

21. *Asplenium hypomelas* Kuhn, Fil. Afr. 104 (1868); Schelpe in F.Z. Pterid.: 187, t. 54A (1970); in C.F.A. Pterid.: 147 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 377, t. 283 (1983). Type: Fernando Po, Mann 448 (K, holo.).

*Davallia nigrescens* Hook., Sec. Cent. t. 93 (1861), non *Asplenium nigrescens* Blume (1828). *Loxoscaphe nigrescens* (Hook.) T. Moore, Ind. Fil. 297 (1861). Type as above.

*Davallia hollandii* Sim in Trans. S. Afr. phil. Soc. 16: 274, t. 4 (1906). *Asplenium hollandii* (Sim) C. Chr., Ind. Fil., Suppl. 1: 11 (1913); Sim, Ferns S. Afr. edn 2: 173, t. 69 (1915). Type: Mozambique, Penhalonga, Holland s.n. (PRE, holo.; NBG!).

Rhizome erect, often long, set with narrowly lanceolate, attenuate, nitid, brown, irregularly fimbriate, hair-pointed rhizome-scales c. 10 mm long. *Fronds* tufted, herbaceous, not gemmiferous; *stipe* dark brown, densely set at first with fimbriate, hair-pointed scales; *lamina* lanceolate to broadly lanceolate, up to  $1,4 \times 0,46$  m, deeply 4- to 5-pinnatifid, basal pinnae reduced; *pinnae* in up to 25 pairs, lanceolate-attenuate; *pinnules* in up to 18 pairs, ovate-lanceolate, acroscopic lobe largest, otherwise divided into somewhat rhombic 3- to 5-lobed segments; *ultimate lobes* oblanceolate, acute, c. 1,2 mm broad, unequally expanded around sori. *Sori* extending from costa to margin, c. 1,2 mm long; *indusium* membranous, entire, c. 0,75 mm broad. Fig. 64: 1.

Transvaal, Zimbabwe, Mozambique, Malawi, Angola, Zaire, Tanzania, Kenya, Uganda, Cameroun, Fernando Po and São Tomé. Known from only one collection in Southern Africa. *A. hypomelas* usually occurs as a low-level epiphyte, in dense shade in moist forest in the eastern districts of Zimbabwe, between 1 300 and 1 900 m altitude, and 2 250 m in tropical Africa. Map 170.

Voucher: Mogg s.n. (J 41513).

The species superficially resembles certain forms of *A. lobatum* (below). See there for notes.

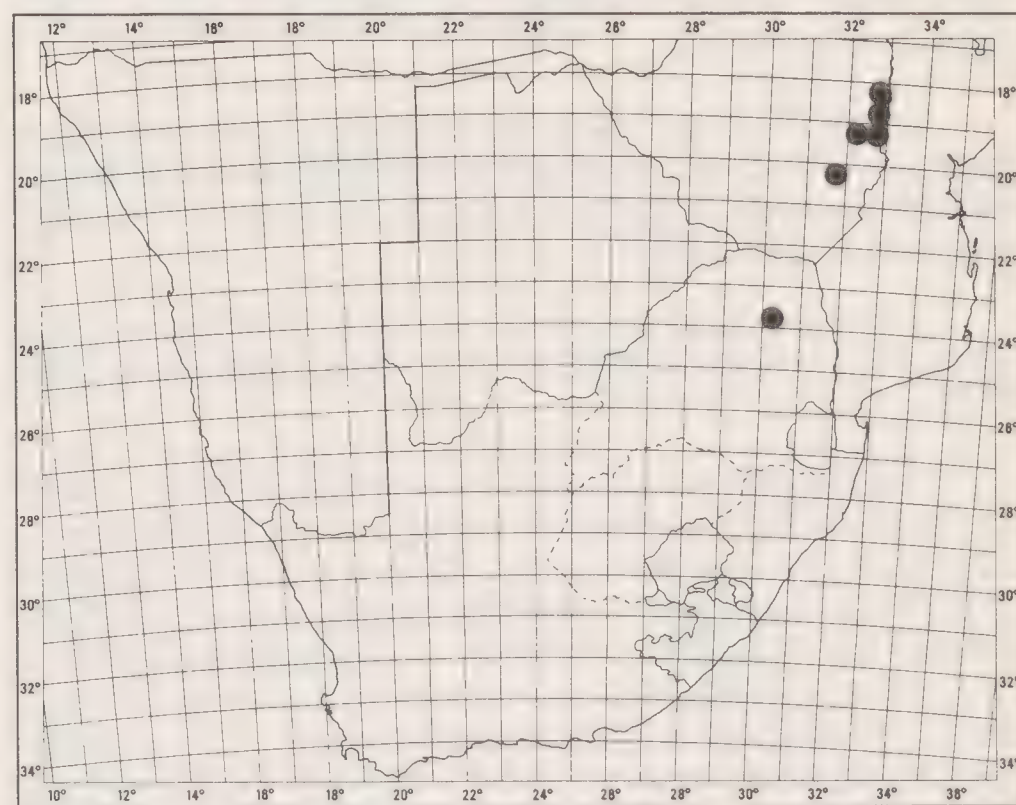
MAP 170.—*Asplenium hypomelas*

FIG. 65.—1, *Asplenium rutifolium*, frond,  $\times 0,6$  (Braithwaite 193). 2, *Asplenium varians* subsp. *fimbriatum*, part of plant,  $\times 0,6$  (Buchanan sub BOL 23509). 3, *Ceterach cordatum*, upper and lower surfaces of fronds,  $\times 0,6$ ; 3a, detail of lower surface of ultimate segment,  $\times 6$  (Bosman 2876).



22. *Asplenium lobatum* Pappe & Raws., Syn. Fil. Afr. Austr. 22 (1858); Schelpe in F.Z. Pterid.: 177, t. 53A (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 349, t. 258 (1983). Syntypes: Transkei, *Espinasse* s.n. (BM!); Cape Province, Albany, *Atherstone* s.n. (BM!); Tsitsikamma, *Rubidge* s.n. (BM!).

*Asplenium erectum* var. *lobatum* (Pappe & Raws.) Alston & Schelpe in Jl S. Afr. Bot. 18: 161 (1952).

*Asplenium gracile* Pappe & Raws., Syn. Fil. Afr. Austr. 22 (1858), non D. Don (1825). *Asplenium lunulatum* var. *gracile* (Pappe & Raws.) Sim, Ferns S. Afr. edn 2: 146, t. 49 (1915). *Asplenium erectum* var. *gracile* (Pappe & Raws.) Tardieu-Blot in Fl. Madag. 5, 1: 222, t. 30 figs 4, 5 (1958). Type: Natal, *Gueinzius* s.n. (S, holo.).

*Asplenium pappei* T. Moore, Ind. Fil. 152 (1859), nom. nov. for *A. gracile*.

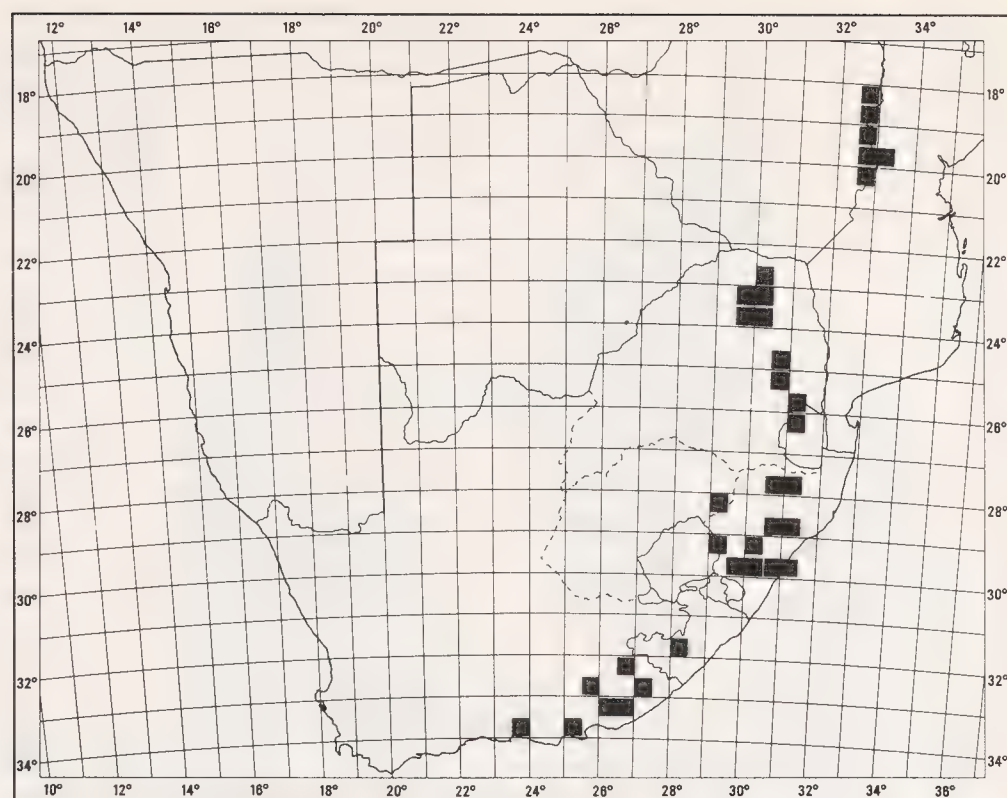
Rhizome erect, up to 7 mm in diameter, set with dark brown, lanceolate-acuminate, subentire rhizome-scales up to 6 mm long with narrow paler borders. *Fronde*s tufted, membranous, usually not gemmiferous (occasionally proliferating at lamina base); *stipe* matt greenish brown, subglabrous at maturity; *lamina* narrowly elliptic, up to 350 × 135 mm, apex acuminate, winging rhachis for most of its length, 2-pinnate to 4-pinnatifid, lower pinnae decrescent; *pinnae* narrowly oblong-deltate, basal acroscopic pinnule overlapping rhachis; *pinnules* rhombic to deltate, coarsely serrate or divided into 3-fid to 2-fid or linear acute lobes, upper surface glabrous, lower surface set with occasional, minute, hair-like, pale scales. *Sori* 3–6 per pinnule, c. 2 mm long (up to 4 mm); *indusium* membranous, entire, c. 0,2 mm broad. Fig. 61: 2.

Cape Province, Transkei, Natal, Transvaal, Zimbabwe, Malawi, Mozambique and Madagascar. On deeply shaded floors of moist forest and occasionally a low-level epiphyte, 1 100–2 000 m. Map 171.

Vouchers: *Esterhuysen* 26063 (BM; BOL); *Flanagan* 2268 (PRE); *Schelpe* 5955 (B; BM; BOL; GH; K; M; MO; P; PRE; S; US).

The more dissected variety of *A. lobatum*, var. *pseudo-abyssinicum* N.C. Anthony & Schelpe, superficially resembles *A. hypomelas* Kuhn, but can easily be distinguished from that species by the nature of the sori which do not form a bulge in the margin of the lobes. In addition the fronds of *A. hypomelas* are usually more than half a metre in length while *A. lobatum* has a much smaller frond. At present var. *pseudo-abyssinicum* has only been found in Zimbabwe and Mozambique.

23. *Asplenium varians* Wall. ex Hook. & Grev., Ic. Fil. t. 172 (1830). Type: Nepal, *Wallich* s.n. (K, holo.).



MAP 171.—*Asplenium lobatum*

The typical form does not occur in Southern Africa.

Subsp. *fimbriatum* (Kunze) Schelpe in Bolm Soc. broteriana, sér. 2, 41: 211 (1967); in F.Z. Pterid.: 177, t. 53E (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 350, t. 259 (1983). Type: Natal, between the Omfondi and Tugela Rivers, *Gueinzius* s.n. (W, holo.—BM, photo.!: HBG—BOL, photo.!: K!).

*Asplenium fimbriatum* Kunze in Linnaea 18: 117 (1844).

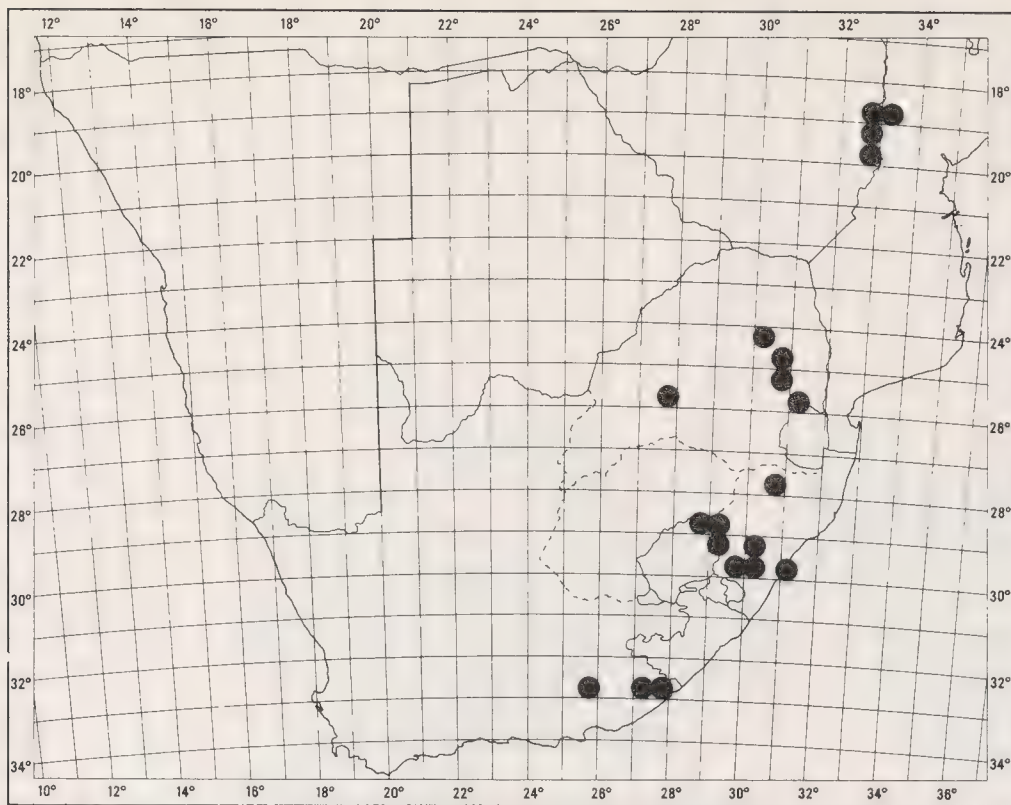
*Asplenium varians* sensu Sim, Ferns S. Afr. edn 2: 146, t. 50 fig. 2, t. 57 fig. 2 (1915).

Rhizome erect, c. 3 mm in diameter, set with dark brown, nitid, lanceolate-attenuate, subentire to somewhat fimbriate rhizome-scales c. 3 mm long. *Fronde*s tufted, firmly membranous to herbaceous, not gemmiferous; *stipe* greenish becoming dark brown basally, set with scattered sinuous, hair-like scales; *lamina* narrowly elliptic, up to 170 × 80 mm, basal pinnae somewhat reduced, 2-pinnate; *pinnae* in up to 12 pairs, acroscopic basal pinnule enlarged; *pinnules* and *pinnule lobes* obovate, c. 6 mm long, outer margin sharply dentate, upper surface glabrous, lower surface set with minute scales. *Sori* 2 to 5 per lobe, c. 3 mm long; *indusium* membranous, almost transparent, erose, c. 0,6 mm broad. Fig. 65: 2.

Eastern Cape Province, Transkei, Natal, Transvaal, Zimbabwe, Mozambique, Zaire, Kenya and Uganda. On mossy shaded boulders, or occasionally on streambanks, in forest, 1 200–1 800 m. Map 172.

Vouchers: *Flanagan* 828 (GRA; PRE; SAM); *Johnstone* 286 (BM; NU); *Junod* 4034 (PRE); *Schlechter* 6782 (GRA; PRE).



MAP 172.—*Asplenium varians* subsp. *fimbriatum*

24. *Asplenium adiantum-nigrum* L., Sp. Pl. 2: 1081 (1753). Iconotype: Dodoens, Stirpium Historiae Pemptades 466 (1616) (lecto!).

Rhizome creeping, c. 4 mm in diameter, set with dark brown, lanceolate, attenuate, entire rhizome-scales c. 3 mm long. *Fronde* very closely spaced, thinly coriaceous, not gemmiferous; *stipe* castaneous, subglabrous at maturity, usually equal to or longer than lamina length; *lamina* narrowly deltate to ovate-lanceolate, c. 50 × 33–310 × 215 mm, 2- to 3-pinnate, basal pinnae largest; *pinnae* in 7–15 pairs, unequally cuneate basally; *pinnules* obcuneate, oblong or obovate, shallowly lobed to deeply pinnatifid or pinnate, outer margin sharply dentate to serrate, upper surface glabrous, lower surface set with minute hair-like scales, especially near bases of segments; *venation* obscure above. *Sori* borne at an oblique angle on either side of costa, up to 3 mm long; *indusium* membranous, entire, c. 0.5 mm broad. Fig. 58: 2.

Cape Province, Transkei, Lesotho, Natal, Orange Free State and Transvaal, as well as Libya, Tanzania, Kenya, Cameroun, Algeria, Morocco, Azores, as well as other Atlantic islands and Réunion, Europe, Asia and Hawaii (Christensen, 1905); Mexico (Knobloch & Correll, 1962). *A. adiantum-nigrum* is a common species in the more moist areas of south-western Cape Province, but becomes increasingly less frequent eastwards and northwards. It grows in a wide range of habitats from shaded forest floors to crevices in exposed rock outcrops, 300–2 000 m altitude.

Lamina up to 150 mm long, 2-pinnate to shallowly 3-pinnatifid, ultimate segments rounded and evenly dentate with numerous (usually 6–20) small teeth..... (a). var. *adiantum-nigrum*

Lamina up to 330 mm long, deeply 3-pinnatifid to 3-pinnate (or occasionally 4-pinnatifid), ultimate segments elongate and unevenly dentate with relatively few (usually up to 6 per lobe) large teeth..... (b). var. *solidum*

#### 24 (a). var. *adiantum-nigrum*.

J. P. Roux, Cape Pensinsula Ferns 45 (1979); W. B. G. Jacobsen, Ferns Sthn Afr. 364, t. 271a (1983).

*Tarachia adiantum-nigrum* (L.) Presl, Epim. Bot. 82 (1849).

*Asplenium lucidum* Burm. f., Prodr. Fl. Cap. 28 (1768). Type: Cape of Good Hope. *Burmans* s.n. (G, holo.–BOL, photo.!).

*Asplenium tabulare* Schrad. in Gött. Gel. Anz. 1818: 916 (1818). Type: Cape, ?Cape Peninsula, *Hesse* s.n. (LE, holo.).

*Asplenium argutum* Kaulf., Enum. Fil. 176 (1824). Type: Cape Province, Cape Peninsula, *Chamisso* s.n. (LE, holo.).

*Asplenium rawsonii* Bak. in J. Bot., Lond. 1872: 362 (1872); Sim, Ferns S. Afr. edn 2: 157, t. 63 fig. 1 (1915). Type: Cape Province, Cape Peninsula, Muizenberg Mountains, *Rawson* s.n. (K, holo.!).

*Asplenium adiantum-nigrum* var. *obtusum* (Kit. ex Willd.) Sim, sensu Sim, Ferns S. Afr. edn 1: 149 (1892).

*Asplenium marlothii* Hieron. in Bot. Jb. 46: 357 (1911). Type: Cape Province, Kuruman, *Marloth* 1095 (B, holo.–BOL, photo.!, PRE!).

Vouchers: *Dieterlen* 241 (PRE; SAM); *Esterhuysen* 25705 (BOL); *Johnstone* 308 (BM; NH; NU); *Moss* 7137 (J); *Saayman* 406 (BLFU). Map 173.

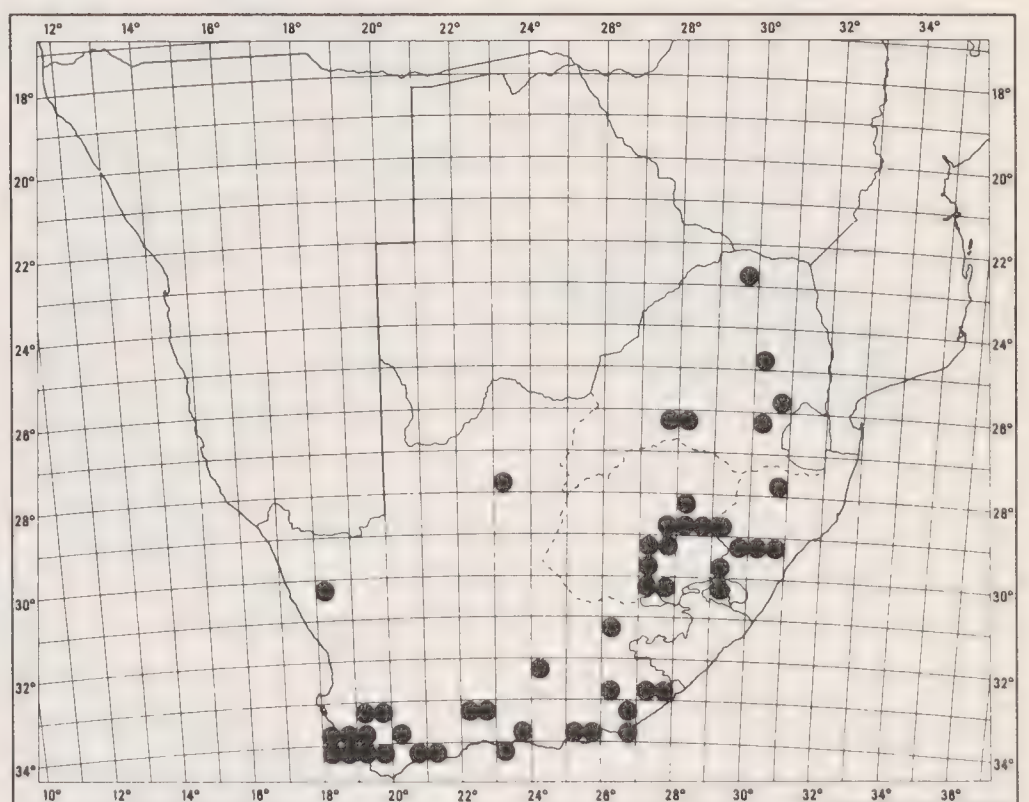
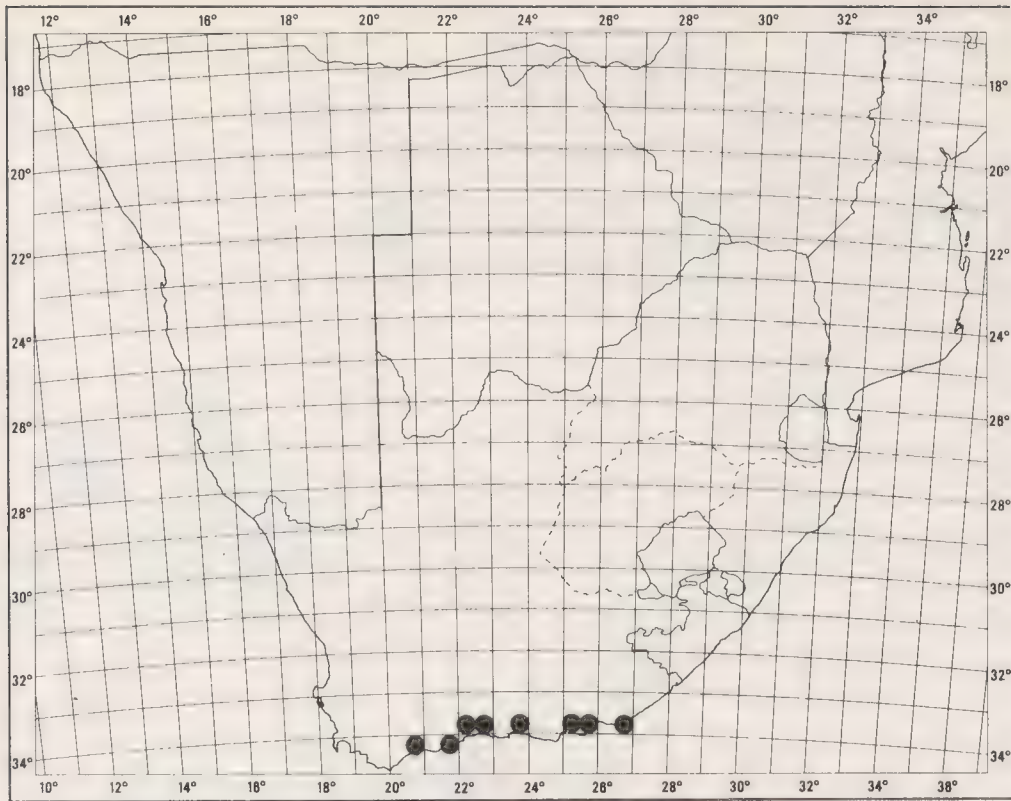
MAP 173.—*Asplenium adiantum-nigrum* var. *adiantum-nigrum*





FIG. 66.—*Asplenium blastophorum*, part of plant,  $\times 0,6$  (Schelpe & Leach 7090).



MAP 174.—*Asplenium adiantum-nigrum* var. *solidum*

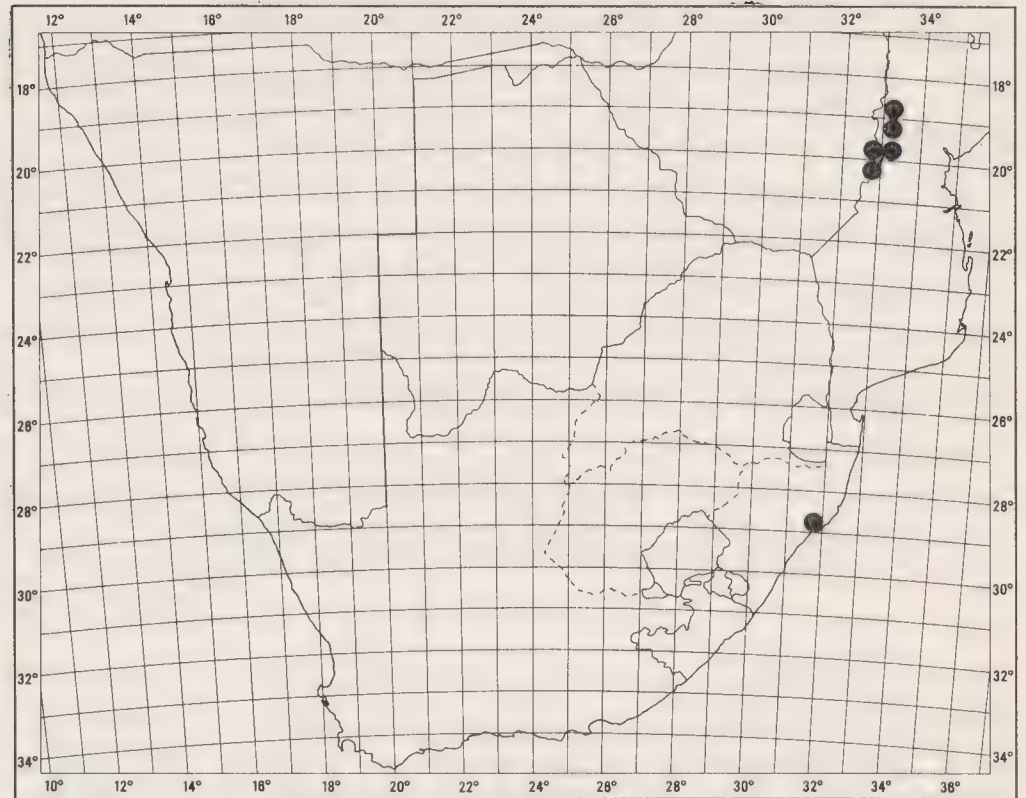
24(b). var. **solidum** (Kunze) J. P. Roux, Cape Peninsula Ferns 45 (1979); W. B. G. Jacobsen, Ferns Sthn Afr. 364, t. 271b (1983). Type: Cape Province, Ruigtevallei, Drège s.n. (LZ, syn.†; BM, lecto.!).

*Asplenium solidum* Kunze in Linnaea 10: 520 (1836); Sim, Ferns S. Afr. edn 2: 159, t. 62 (1915). *Tarachia solida* (Kunze) Presl, Epim. Bot. 80 (1849).

Vouchers: Esterhuysen 26241 (B; BOL; C; GH; K; M; MO; P; PR; PRE; S); 26259 (B; BM; BOL; C; GH; K; M; MO; NBG; NU; P; PR; PRE; S; STE). Map 174.

25. ***Asplenium blastophorum*** Hieron. in Bot. Jb. 46: 378 (1911); Schelpe in F.Z. Pterid.: 183 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 358, t. 267 (1983). Type: Sudan, Schweinfurth 3295 (B, lecto.; BM!; K!).

Rhizome creeping, c. 7 mm in diameter, set with linear-lanceolate, dark brown, entire rhizome-scales c. 3 mm long, with paler narrow borders. *Fronde*s tufted, thinly coriaceous, gemmiferous, rarely gemmiferous at base of apical segment of each pinna as well as terminally; *stipe* matt black, set with fimbriate scales; *lamina* narrowly oblong-ovate to deltate, acute, up to 480 × 200 mm, 2-pinnate to 3-pinnatifid, basal pinnae slightly larger than those above; *pinnae* lanceolate-deltate, unequally cuneate basally, attenuate, progressively more deeply divided towards base into oblong-cuneate or rhombic pinnae with outer margins sharply serrate and irregularly incised, upper surface glabrous, under surface set with occasional scales. *Sori* of irregular lengths, up to 20 mm long; *indusium* membranous, entire, c. 0,4 mm broad. Fig. 66.

MAP 175.—*Asplenium blastophorum*

Natal, Zimbabwe, Mozambique, Malawi, Kenya, Sudan; also Guinea, Togo, Sierra Leone, Nigeria and East Africa (Alston, 1959). A forest species growing on forest floors or on humus-covered boulders, but occasionally as a low-level epiphyte, 160–1 100 m. Map 175.

Voucher: Braithwaite 48 (BOL).

26. ***Asplenium splendens*** Kunze in Linnaea 10: 516 (1836). Type: Cape Province, Krakamma and Katrivier, Ecklon & Zeyher s.n. (LZ, holo.†; S, lecto.–BOL, photo.!: L–BOL, photo.!).

*Tarachia splendens* (Kunze) Presl, Epim. Bot. 83 (1849). *Asplenium cuneatum* var. *splendens* (Kunze) Sim, Ferns S. Afr. edn 2: 161, t. 64 fig. 2 (1915). *Asplenium splendens* subsp. *splendens*; Braithwaite in Jl S. Afr. Bot. 38: 12, fig. 1a–f, fig. 2a–b (1972); W. B. G. Jacobsen, Ferns Sthn Afr. 365, t. 272 (1983).

*Asplenium cuneatum* sensu Sim, Ferns S. Afr. edn 2: 161, t. 64 fig. 1 (1915).

Rhizome creeping, c. 5 mm in diameter, set with dark brown, nitid, subentire, hair-pointed rhizome-scales c. 5 mm long. *Fronde*s spaced 5–20 mm apart, herbaceous to thinly coriaceous, not gemmiferous; *stipe* matt brown, thickly set at first with irregularly fimbriate scales up to 5 mm long, persistent basally; *lamina* subovate, up to 370 × 180 mm, basal pinnae not conspicuously reduced, 2- to 3-pinnate; *pinnae* in 9–16 pairs, subdivided into as many as 16 cuneate rounded trapeziform pinnules, outer margin shallowly lobed, lobes sharply dentate to crenate, upper surface glabrous, lower surface set with hair-like, fimbriate-based scales, especially at bases of segments. *Sori* of irregular lengths, up to 10 mm long; *indusium* membranous, entire, c. 0,3 mm broad. Fig. 67:1.

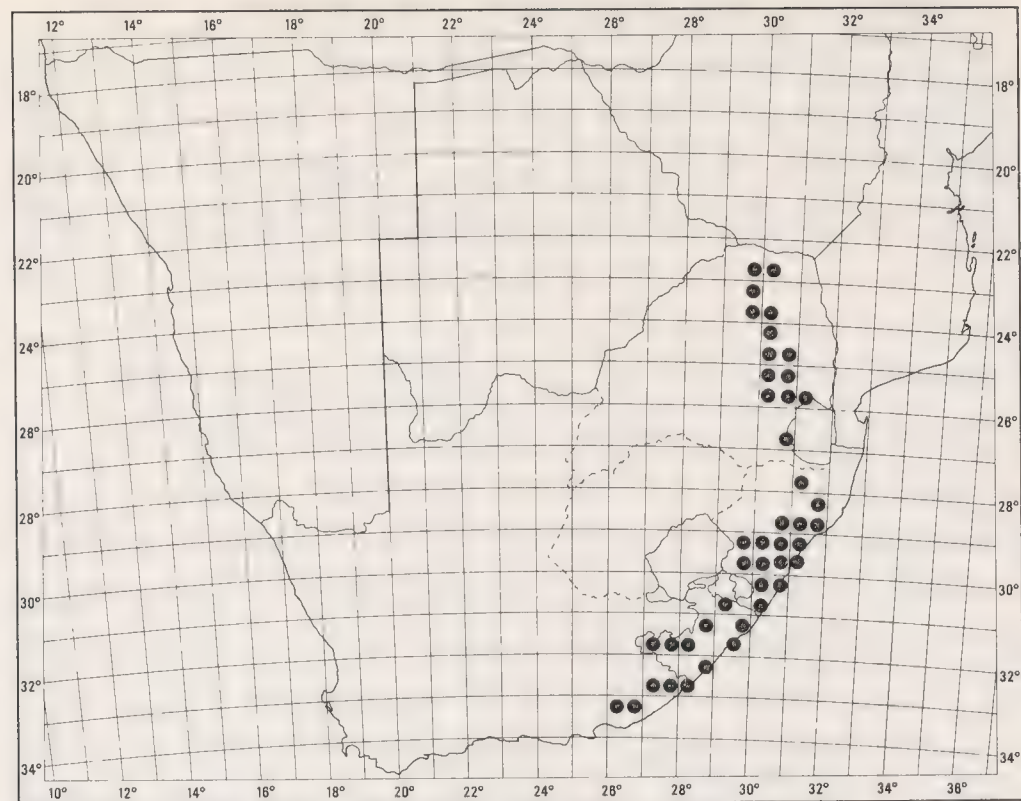




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MAP 176.—*Asplenium splendens*

Cape Province, Transkei, Natal, Swaziland and Transvaal. Forest floors or rarely a low-level epiphyte, 25–1 700 m. Map 176.

Vouchers: *Daly* 779 (GRA; PRE); *Schelppe* 5964 (B; BOL; GH; K; M; MO; P; PRE; S; US); *Taylor* 2634 (BOL; NBG); *Wager* 115 (PRE); 116 (PRE); *Ward* 2257 (BOL; NPB; NU).

According to Braithwaite (1972) *A. splendens* has been involved in the formation of 2 taxa by hybridisation and polyploidy. He recognised the subspecific taxon *A. splendens* subsp. *drakensbergense* and postulated the formation of specific taxa as follows: *A. splendens* subsp. *splendens* (n = 72) × *A. splendens* subsp. *drakensbergense* (n = 72) = *A. multifforme* Krass. (n = 144). *A. splendens* × *A. ramlowii* Braithwaite (n = 72) = *A. schelppei* Braithwaite (n = 144). This latter postulate is questionable as *A. schelppei* is said to occur in Transvaal while *A. ramlowii* has not been found south of the Melssetter district of Zimbabwe.

The present authors prefer to regard *A. multifforme* and *A. schelppei* as cytospecies, and *A. splendens* sens. lat. as a species complex.

**27. *Asplenium simii* Braithwaite & Schelppe** in Bolm Soc. broteriana, sér. 2, 41: 209 (1967); Schelppe in F.Z. Pterid.: 181 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 369, t. 276 (1983). Type: Zimbabwe, Vumba Mountains, Elephant Forest, Chase 6274 (BOL, holo.!: SRGH).

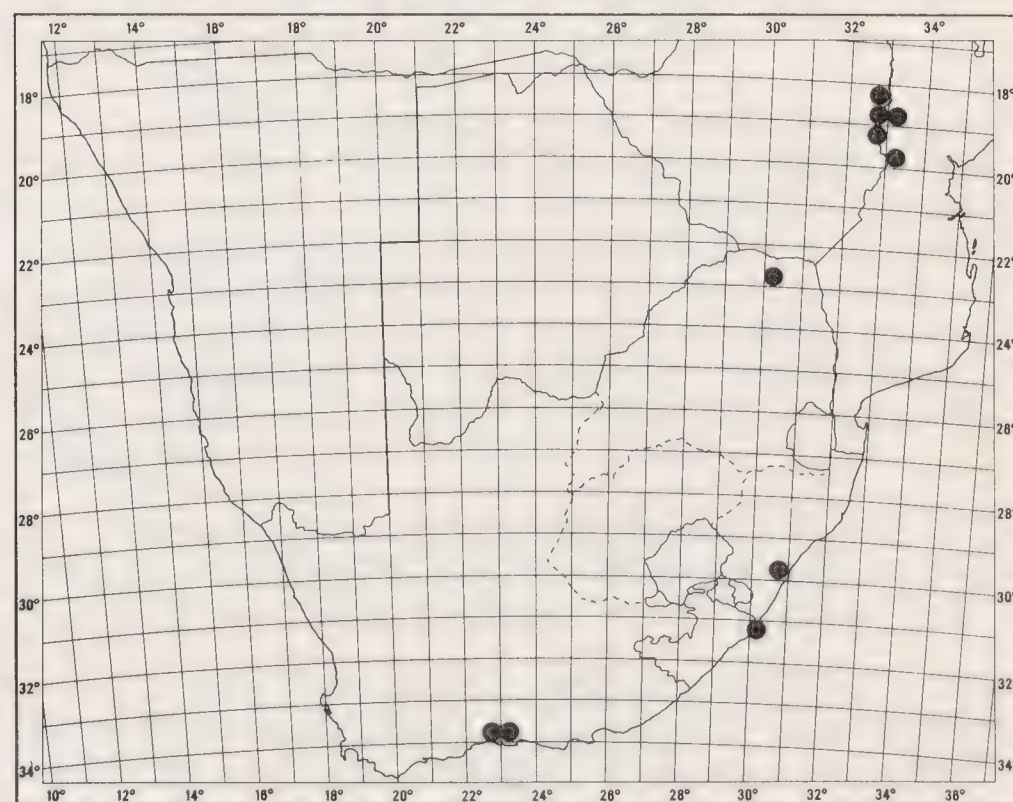
*Asplenium cuneatum* var. *angustatum* Sim, Ferns S. Afr. edn 1: 152, t. 78 fig. 2 (1892); edn 2: 162, t. 63 fig. 2 (1915). *Asplenium splendens* var. *angustatum* (Sim) C. Chr. in Dansk bot. Ark. 7: 100 (1932). Type: Cape Province, Knysna forest, Barkly s.n. (SAM 50586, holo.!).

Rhizome erect, c. 5 mm in diameter, set with linear-attenuate, black, entire, hair-pointed rhizome-scales c. 8 mm long. Fronds tufted, coriaceous, not gemmiferous; stipe matt

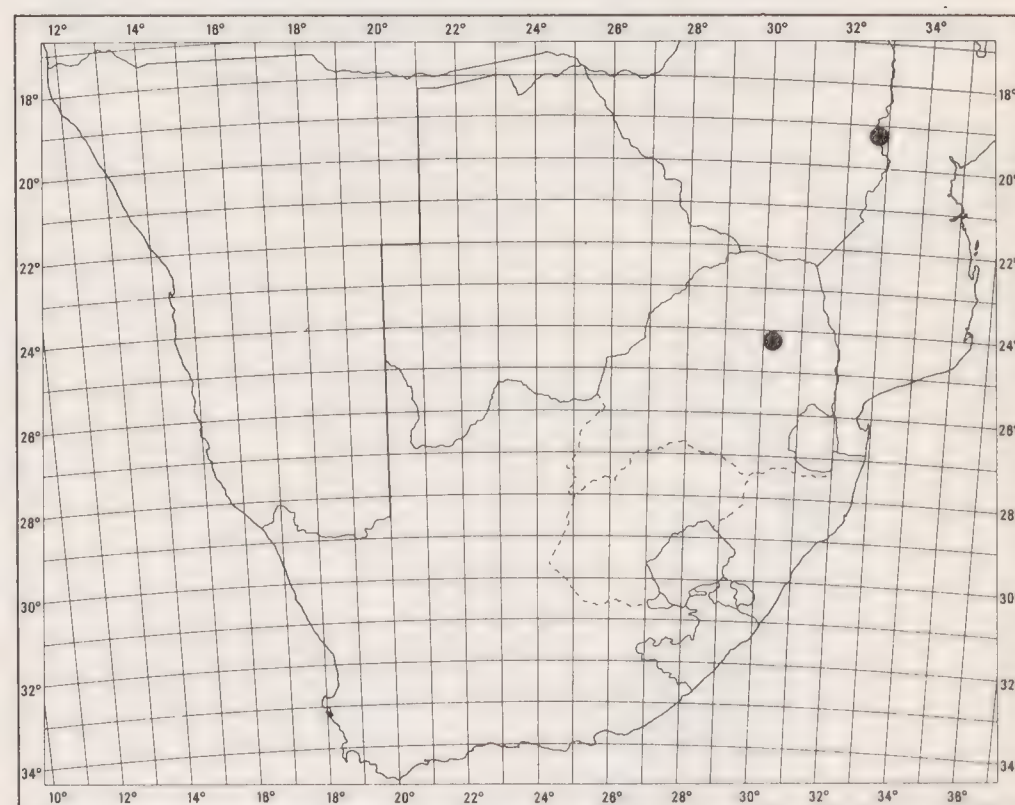
brown, glabrous at maturity except for scales basally; lamina narrowly oblong, acute, c. 280 × 130 mm, deeply 2-pinnatifid to 2-pinnate, basal pinnae not reduced; pinnae in c. 10 pairs, trapeziform, deeply incised into 3–5 obtuse lobes, terminal lobe acuminate and caudate, outer margins dentate, upper surface glabrous, lower surface set with scales c. 2 mm long (often with 2 basal outgrowths), especially at bases of segments. Sori of irregular lengths, up to 8 mm long; indusium membranous, entire, c. 0,3 mm broad.

Southern Cape Province, Transkei, Natal, Transvaal, Zimbabwe, Mozambique and Kenya. On boulders and old stumps, or epiphytic, or occasionally on forest floors, 290–1 900 m. Map 177.

Vouchers: *Bayliss* 2223 (BOL; NBG); *Geldenhuis* 580 (BOL); *Marloth* 5761 (PRE).



MAP 177.—*Asplenium simii*



MAP 178.—*Asplenium lividum*





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FIG. 68.—1, *Asplenium lividum*, part of frond,  $\times 0,6$  (Chase 6571); 1a, basal portion of plant,  $\times 0,6$ .



28. *Asplenium lividum* Mett. ex Kuhn in Linnaea 36: 100 (1869); Schelpe in F.Z. Pterid.: 181 (1970); in C.F.A. Pterid.: 143 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 360, t. 268 (1983). Type: Venezuela, Tovar, Fendler 156 (B, holo.—BM, photo.!: K!).

Rhizome suberect, up to 7 mm in diameter, set with brown, lanceolate, sharply acute, nitid, entire rhizome-scales c. 3 mm long. Fronds tufted, firmly herbaceous, not gemmiferous; stipe dark brown, often darker basally, set with scattered scales; lamina narrowly oblong-ovate acute, up to 365 × 90 mm, pinnatifid to weakly 3-pinnatifid, basal pinnae not reduced; pinnae in c. 16 pairs, unequally rhombic-attenuate, very unequally cuneate basally and deeply pinnatifid into narrowly oblanceolate, cuneate to linear, sharply serrate lobes, basal acroscopic lobe largest, upper surface glabrous, lower surface set with occasional scales. Sori 1–7 per lobe, c. 5 mm long; indusium membranous, entire, c. 0.4 mm broad. Fig. 68.

Transvaal, Zimbabwe, Mozambique, Angola, Zambia, Tanzania, Kenya, Uganda, São Tomé, as well as South America. Lithophytic on humus-covered boulders in forest, 1 300–1 600 m. Map 178.

Vouchers: Junod 4030 (PRE); Moss & Rogers 312 (PRE).

29. *Asplenium aethiopicum* (Burm. f.) Becherer in Candollea 6: 22 (1935); Schelpe in F.Z. Pterid.: 181 (1970); in C.F.A. Pterid.: 144 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 361, t. 269 (1983). Type: Cape Province, Herb. Burmann (G, holo.!).

*Trichomanes aethiopicum* Burm. f., Prodr. Fl. Cap. 32 (err. 28) (1768).

*Asplenium adiantoides* Lam., Encycl. 2: 309 (1786), non (L.) C. Chr. (1905). Type: Mauritius, Commerson s.n., Herb. Jussieu 1251 (P, lecto.—BOL, photo.!: and illustr.!).

*Asplenium falsum* Retz., Obs. Bot. 6: 38 (1791). Type: Cape Province, Cape Peninsula, False Bay, Herb. Retzius (LD, holo.!).

*Asplenium furcatum* Thunb., Prodr. 172 (1800). *Tarachia furcata* (Thunb.) Presl, Epim. Bot. 80 (1851), reimpr. in Abh. K. Böhm. Ges. Wiss., ser. 5, 6: 440 (1851). Type: Cape Province, Cape Peninsula, Thunberg s.n. (UPS, holo.!: LD!: S!: SBT!).

*Asplenium gueinzianum* Mett. ex Kuhn, Fil. Afr. 103 (1868). Type: Natal, Gueinzus s.n. (B, holo.!).

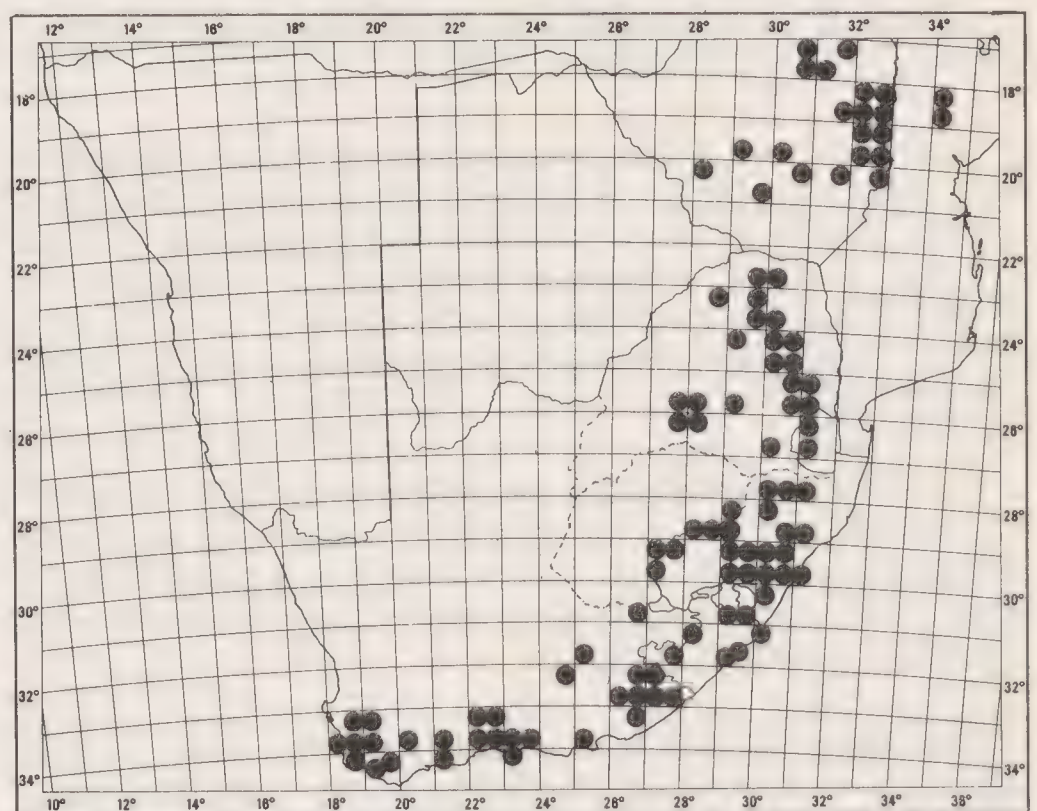
*Asplenium praemorsum* sensu Sim, Ferns S. Afr. edn 2: 163, t. 65, 66 (1915).

Rhizome ascending or creeping, up to 7 mm in diameter, set with linear-attenuate, ferrugineous to atrocastaneous, hair-pointed, irregularly serrulate rhizome-scales often with paler reddish margins. Fronds tufted, firmly herbaceous to thinly coriaceous, not gemmiferous; stipe matt brown to atrocastaneous, set with scattered scales; lamina oblong to lanceolate, attenuate, up to 480 × 200 mm (rarely 750 × 400 mm), 2-pinnate to 4-pinnatifid, lower pinnae only slightly reduced; pinnae in c. 12 pairs, acute to caudate, divided into narrowly obcuneate to very narrowly oblong segments, upper segments adnate and decurrent, irregularly incised and dentate, upper surface often set with occasional substellate or fimbriate scales, lower surface thickly to thinly set with hair-pointed, broad-based scales. Sori of irregular lengths, up to 9 mm long; indusium membranous, subentire, c. 0.4 mm broad. Fig. 67: 2.

Cape Province, Transkei, Natal, Lesotho, Orange Free State, Swaziland, Transvaal, Zimbabwe, Mozambique, Malawi, Zambia, Angola, Zaire, Burundi, Tanzania, Uganda, Kenya, Somalia, Ethiopia, Sudan, Yemen, Mauritius and Madeira, Fernando Po, Cameroun, Nigeria and Sierra Leone (Alston, 1959); Madagascar and Comoro Islands (Tardieu-Blot, 1958). A common fern in Southern Africa; lithophytic, epiphytic or terrestrial in forest, 200–2 140 m. Map 179.

Vouchers: Compton 25541 (NBG; PRE); 25946 (NBG; PRE); Esterhuysen 12622 (BOL; PRE); Moll & Morris 677 (NU); Pott 4840 (BOL; PRE); Schirach 277 (BOL; NBG).

*A. aethiopicum* is a very variable species. An investigation of spores (Braithwaite, 1964) found that in Southern Africa this taxon has a number of chromosome complements ranging from tetraploid (4n) to decaploid (10n); also some are apogamous enabling them to colonise drier habitats than the sexual plants. The resulting variability in size, frond dissection, indument etc. has led the author to consider it as a species complex, *A. aethiopicum* sens. lat.



MAP 179.—*Asplenium aethiopicum*



## 2. CETERACH

**Ceterach** DC. in Lam. & DC., Fl. Fr. edn 3, 2: 566 (1805); Engl., Pflanzenw. Afr. 2: 32 (1908); Tardieu-Blot in Fl. Madag. 5, 1: 180 (1958); Launert in F.S.W.A. 9: 1 (1969); Schelpe in F.Z. Pterid.: 188 (1970); in C.F.A. Pterid.: 148 (1977). Type species: *C. officinarum* DC. (= *Asplenium ceterach* L.).

Rhizomes erect, short. *Fron*ds usually deeply pinnatifid to 2-pinnatifid, upper surface glabrous at maturity, lower surface densely scaly; *stipe* short, tufted, densely scaly; *veins* usually anastomosing marginally. *Sori* elongate along veins; *indusium* obsolete.

A genus of about 5 species in Europe, Asia and Africa.

**Ceterach cordatum** (Thunb.) Desv. in Mém. Soc. Linn., Paris 6, 2: 223 (1827); Sim, Ferns S. Afr. edn 2: 175, t. 73 figs 1–3, t. 141 fig. (1915); Schelpe in F. Z. Pterid.: 188, t. 54F (1970); in C.F.A. Pterid.: 148 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 379, t. 17 (1983). Type: Cape Province, Herb. Thunberg (UPS, holo.!).

*Acrostichum cordatum* Thunb., Prodr. 171 (1800). *Asplenium cordatum* (Thunb.) Swartz in J. Bot., Gött. 1800, 2: 54 (1801). *Grammitis cordata* (Thunb.) Swartz, Syn. Fil. 23, 217 (1806). *Cincinalis cordata* (Thunb.) Desv. in Mag. Ges. Naturf. Fr. Berl. 5: 311 (1811). *Notholaena cordata* (Thunb.) Desv. in J. Bot., Paris 1, App. 92 (1813). *Gymnogramma cordata* (Thunb.) Schlecht., Adumbr. 16 (1825).

*Ceterach crenata* Kaulf., Enum. Fil. 85 (1824), nom. illeg. Type from Cape of Good Hope.

*Gymnogramma capensis* Spreng. ex Kaulf. in Linnaea 6: 183 (1831), nom. nud. *Ceterach cordatum* var. *capense* (Spreng. ex Kaulf.) Kumm. in Bot. Kozl. 8: 287 (1909). Type: Cape Province, Cape Peninsula, Lions Head, Zeyher s.n. (BOL, iso.!).

*Ceterach capense* Kunze in Linnaea 10: 496 (1836), as *capensis*. *Grammitis capensis* (Kunze) T. Moore, Ind. Fil. 232 (1857). Syntypes from Cape Province and Transkei, Ecklon, Drège and Zeyher (LZ†).

*Gymnogramma cordata* var. *subbipinnata* Hook., Sec. Cent. t. 7 (1860). Type not found.

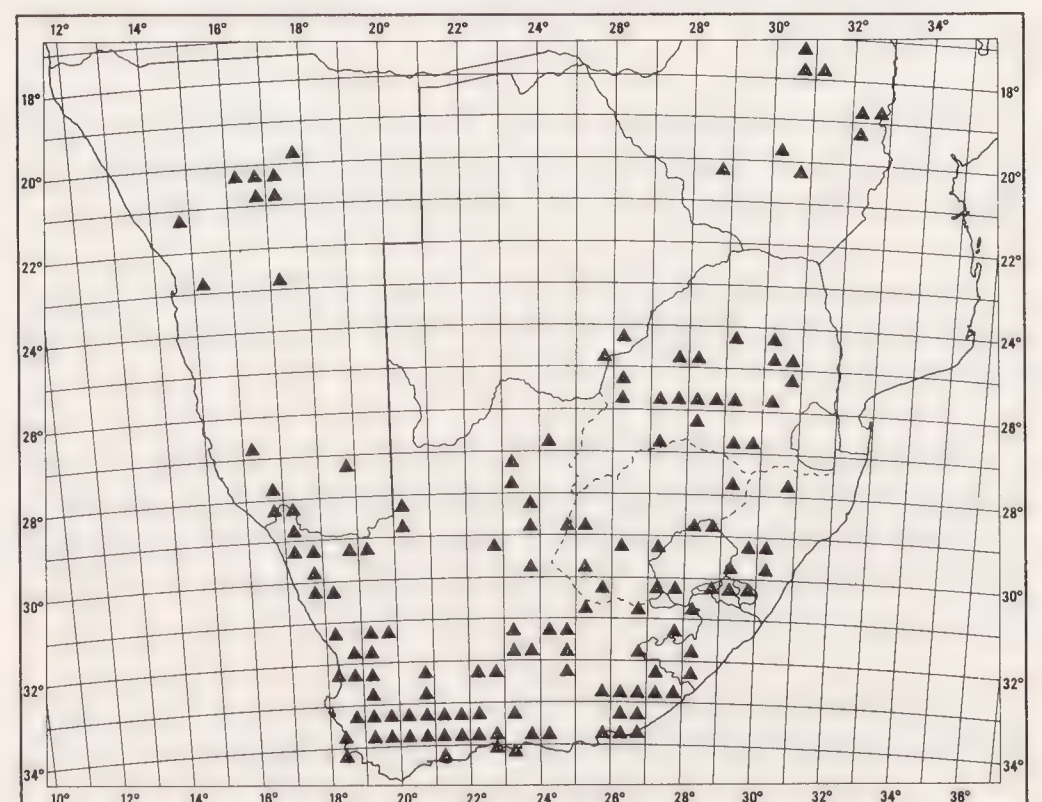
*Gymnogramma namaquensis* Pappe & Raws., Syn. Fil. Afr. Austr. 42 (1858). *Gymnogramma cordata* var. *namaquensis* (Pappe & Raws.) Sim, Ferns S. Afr. edn 1: 212, t. 125 fig. 3 (1892). *Ceterach cordatum* var. *namaquensis* (Pappe & Raws.) Sim, Ferns S. Afr. edn 2: 176, t. 73 fig. 3 (1915). Type: Cape Province, Namaqualand, near Modderfontein, Whitehead s.n. (Type not found).

*Gymnogramma cordata* var. *bipinnata* Sim, Ferns S. Afr. edn 1: 212, t. 125 fig. 2 (1892). *Notholaena bipinnata* (Sim) Sim, Ferns S. Afr. edn 2: 224, t. 109 fig. 2 (1915), excl. Eyles & Johnson 1020 (GRA!). Type: Namaqualand, Holland s.n. (NBG, lecto.!).

*Ceterach cordatum* var. *pinnatifidum* Sim, Ferns S. Afr. edn 2: 177, t. 141 fig. 2 (1915). Type: Cape Province, Somerset East, Boschberg, Schlechter 2703 (GRA, lecto.!: BM!).

Rhizome up to 4 mm in diameter, set with lanceolate-acuminate, dark brown, irregularly fimbriate rhizome-scales c. 3.5 mm long, frequently hair-pointed. *Fron*ds tufted, suberect, not gemmiferous, thinly carnose-coriaceous, involute when dry; *stipe* atrocastaneous, nitid, very much shorter than lamina, densely set with ovate-lanceolate acuminate scales up to 5 mm long; *lamina* elliptic to narrowly elliptic, rarely up to 240 × 85 mm, pinnatifid or pinnate, to 2-pinnatifid or 2-pinnate, lower pinnae gradually decrescent; *pinnae* narrowly oblong, up to 28 × 9 mm, adnate to auriculate, weakly undulate to pinnatifid with broadly oblong crenate segments, upper surface glabrous, lower surface densely set with ovate-acuminate to lanceolate, imbricate, nitid, pale brown, irregularly fimbriate scales; *venation* obscure. *Sori* linear, up to 2.5 mm long, borne in two rows alongside and at an angle to costa, and smaller sori also borne on pinnatifid segments. Fig. 65: 3.

Kenya, Tanzania, Zimbabwe, Madagascar and widespread in Southern Africa in the drier parts where it usually occurs around boulder bases, under bushes or in south aspect rock crevices, 200–2 575 m. Map 180.



MAP 180.—*Ceterach cordatum*



Vouchers: *Acocks* 11398 (NH; PRE); *Burt Davy* 208 (GRA; PRE); *Dieterlen* 566 (PRE; SAM); *Dinter* 6160 (BM; BOL; STE); *Schelte* 5890 (BM; BOL; GH; NBG; PR).

*C. cordatum* is very variable in the dissection of the fronds. Although the more deeply incised 2-pinnatifid and 2-pinnate forms are most frequent in Namaqualand, and the pinnatifid and pinnate forms more frequent in the southern coastal areas, no character has been found to distinguish varieties satisfactorily. Consequently *C. cordatum* (Thunb.)

Desv. is regarded here as a single variable species. Should the pinnatifid and pinnate forms prove to be genetically distinct from the more dissected forms, they could be referred to var. *pinnatifidum* Sim or var. *pinnata* Hook.

An examination of the material upon which Sim (1915) based his *Notholaena bipinnata* has led the present authors to the conclusion that this species is founded on firstly an abnormal frond of *C. cordatum* and secondly on normal sterile and fertile fronds of *Cheilanthes inaequalis* (Kunze) Mett. (Schelte, 1954).

## THELYPTERIDACEAE

Terrestrial plants with creeping or erect rhizomes, set with brown or black non-peltate rhizome-scales. *Stipe* not articulated, with 2 vascular strands basally, fusing upwards to form a single U-shaped strand. *Lamina* pinnate to 2-pinnate (rarely 3- to 4-pinnatifid), usually narrowly oblong in outline, glabrous, pubescent or pilose; *veins* free, or few to many pairs of veins arising from adjoining costules anastomosing into a vein running to the sinus between the pinna lobes (excurrent vein). *Sori* round with or without a reniform indusium to linear and exindusiate. *Spores* monolet, with perispore.

1a Fronds simply pinnate to 2-pinnatifid:

2a Fronds not proliferous or only proliferous near apex; soral paraphyses absent ..... 1. *Thelypteris*

2b Fronds proliferous anywhere on rhachis; soral paraphyses present ..... 3. *Ampelopteris*

1b Fronds bipinnate to 4-pinnatifid ..... 2. *Macrothelypteris*

### 1. THELYPTERIS

*Thelypteris* Schmid., Ic. Pl., edn Keller 45, t. 11, 13 (1763); Tardieu-Blot in Mém. Inst. fr. Afr. noire 28: 116 (1953); in Fl. Madag. 5, 1: 271 (1958); Alston in F.W.T.A. edn 2, Suppl. 60 (1959); Tardieu-Blot in Fl. Camer. 3: 238 (1964); Launert in F.S.W.A. 10: 1 (1969); Schelte in F.Z. Pterid.: 189 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 78 (1973); in C.F.A. Pterid.: 149 (1977). Type species: *T. palustris* Schott (= *Acrostichum thelypteris* L.).

Rhizome creeping or erect, set with brown rhizome-scales. *Fronds* tufted or spaced; *lamina* pinnate to deeply 2-pinnatifid (rarely 3-pinnatifid); *veins* free, or with one or more pairs of veins from adjoining costules anastomosing into a vein running to the sinus between the pinna lobes. *Sori* round, with or without an indusium, or more rarely linear, exindusiate; paraphyses absent.

A large, cosmopolitan genus with about 30 species in continental Africa.

In order to produce a workable treatment of the very numerous species of *Thelypteris* in Asia, Holttum (1971, 1974) divided them among several genera. However, in view of the much smaller number of species found in Southern Africa, *Thelypteris* is construed here in the wider sense.

1a Veins of pinna lobes with one or more pairs anastomosing below sinus between pinna lobes:

2a Fronds proliferous at apex; c. 4 pairs of veins anastomosing below sinus; sori exindusiate ..... 1. *T. madagascariensis*

2b Fronds non-proliferous; 1–2 pairs of veins anastomosing below sinus; sori indusiate:

3a Basal pairs of pinnae not reduced ..... 2. *T. interrupta*

3b Lowest 2–6 (or more) pairs of pinnae gradually decrescent:

4a Fronds up to 2,5 m long; lowest 6 or more pairs of pinnae gradually decrescent ..... 6. *T. altissima*

4b Fronds up to 1,5 m long; lowest 2–4 pairs of pinnae gradually decrescent ..... 7. *T. dentata*

1b Veins of pinna lobes not anastomosing or basal vein meeting at sinus or in a membrane extending from sinus towards costa:

5a Sori elongate, exindusiate ..... 4. *T. pozoi*

5b Sori round, indusiate:

6a Basal veins quite free, not ending at base of sinus:

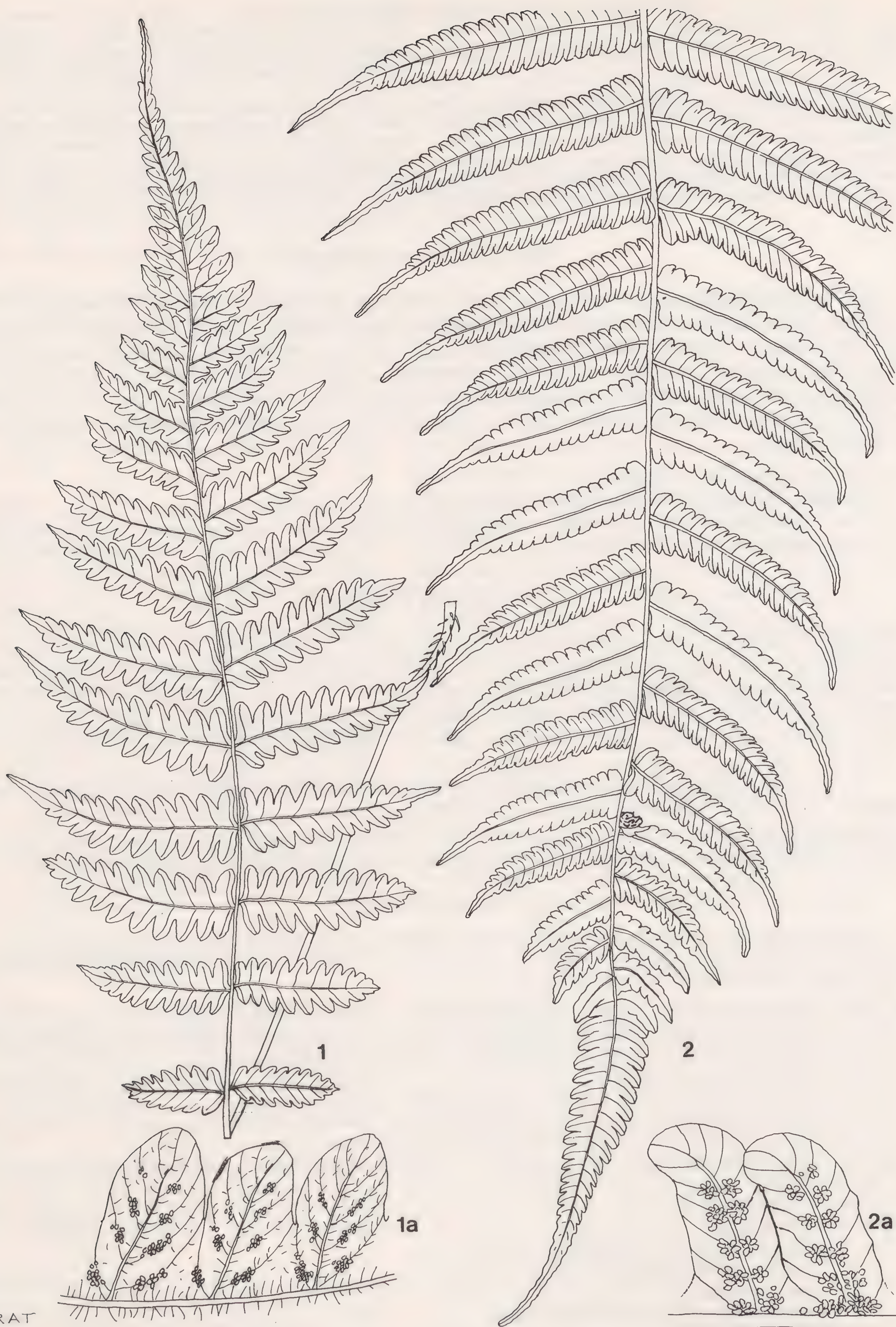
7a Ovate scales borne along lower surface of costae ..... 3. *T. confluens*

7b Ovate scales absent:

8a Hairs on lower surface of lamina hooked ..... 11. *T. bergiana*

8b Hairs on lower surface of lamina straight ..... 10. *T. knysnaensis*





HERRAT  
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6b Basal veins meeting in sinus, or at least one ending at base of sinus:

9a Fronds decrescent with a series of much-reduced pinnae at base..... 5. *T. pulchra*

9b Fronds without a long series of much-reduced pinnae at base:

10a Rhizome creeping, fronds spaced up to 10 mm apart; lamina, especially costae, thickly pilose, hairs on costae and costules uniform, mostly 0,5–1 mm long..... 8. *T. chaseana*

10b Rhizome erect, fronds tufted; lamina thinly pilose, hairs on costae of different sizes, mostly 0–0,5 mm long ..... 9. *T. gueinziana*

1. ***Thelypteris madagascariensis* (Fée)**  
*Schelpé* in JI S. Afr. Bot. 31: 267 (1965); in F.Z. Pterid.: 196, t. 55D (1970). Type: Madagascar, Goudot s.n. (P, holo.!, G!).

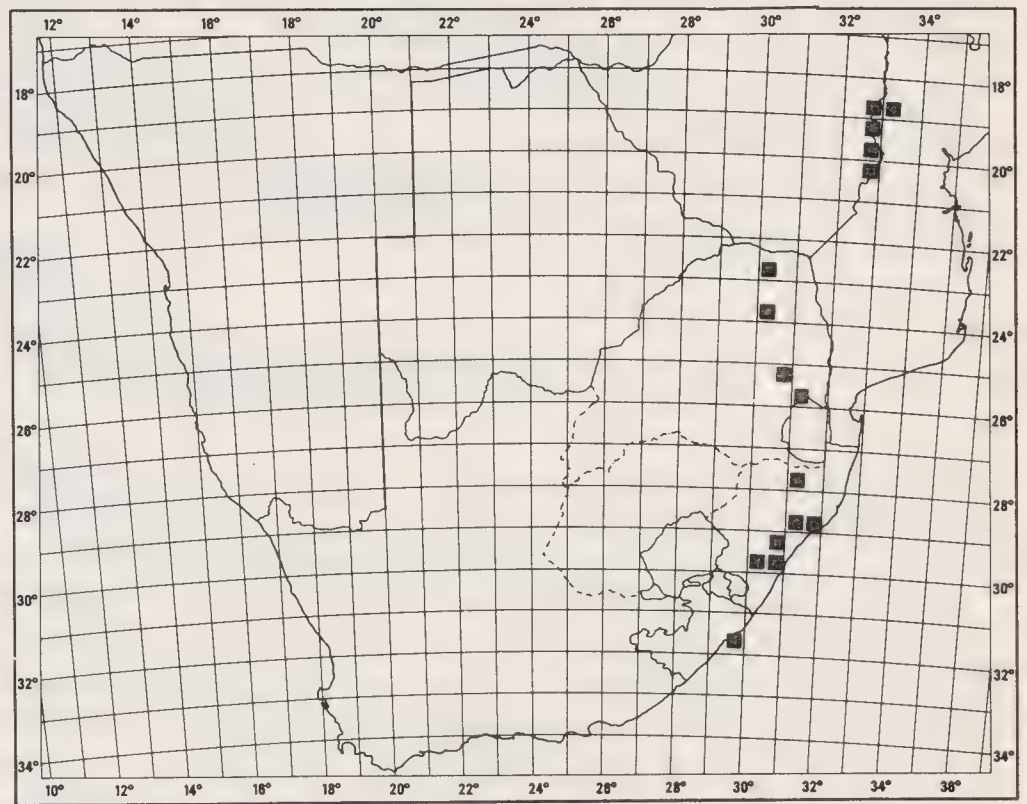
*Goniopteris madagascariensis* Fée, Mém. Fam. Foug. 5: 251 (1852). *Dryopteris madagascariensis* (Fée) C. Chr., Ind. Fil. 276 (1905). *Cyclosorus madagascariensis* (Fée) Ching in Bull. Fan Memor. Inst. Biol., Bot. 10: 246 (1941).

*Gymnogramma unita* Kunze in Linnaea 18: 115 (1844), non *Cyclosorus unitus* (L.) Ching (1932), nec *Thelypteris unita* (L.) Morton. *Phegopteris unita* (Kunze) Mett., Farn-gatt. 4: 306, n. 22 (1858). *Polypodium unitum* (Kunze) Hook., Sp. Fil. 5: 5 (1863), non L. (1759). *Goniopteris unita* (Kunze) J. Sm., Hist. Fil. 192 (1875). *Pneumatopteris unita* (Kunze) Holttum in JI S. Afr. Bot. 40: 155 (1974); W. B. G. Jacobsen, Ferns Sthn Afr. 399, t. 301 (1983). Type: Between the Umfundi and Tugela at Port Natal (i.e. Durban), *Gueinzius* s.n. (LZ, holo.†; HBG-BOL, photo.!).

*Goniopteris patens* Fée, Mém. Fam. Foug. 5: 253 (1852). *Nephrodium patens* (Fée) J. Sm., Hist. Fil. 208 (1875), non (Swartz) Desv. (1827). *Cyclosorus patens* (Fée) Copel., Gen. Fil. 143 (1947). Type: Natal, *Gueinzius* s.n.

*Goniopteris silvatica* Pappe & Raws., Syn. Fil. Afr. Austr. 39 (1858), nom. illeg. *Dryopteris silvatica* (Pappe & Raws.) C. Chr., Ind. Fil. 292 (1905); Sim, Ferns S. Afr. edn 2: 100, t. 15 (1915). *Cyclosorus silvaticus* (Pappe & Raws.) Ching in Bull. Fan Memor. Inst. Biol., Bot. 10: 249 (1941). *Thelypteris silvatica* (Pappe & Raws.) Reed in Phytologia 17: 313 (1968). Type: Natal, *Gueinzius* s.n. (not found).

Rhizome erect. Fronds tufted, arching, herbaceous, proliferating by gemmae borne in an angle of the rhachis near frond apex; stipe pale brown to stramineous, glabrous, up to 0,75 m long; lamina lanceolate, up to 1,8 × 0,5 m, pinnate; pinnae acute to acuminate, somewhat deflexed basally (hardly reduced); middle pinnae truncate basally (acroscopic basal lobe often somewhat enlarged), shallowly incised into broadly oblong, somewhat falcate, obtuse lobes up to 5 mm broad; c. 4 pairs of veins anastomosing below sinus either in a membrane extending from sinus or below it. Sori circular, up to 20 per lobe, borne close to costules, exindusiate. Fig. 69: 2.



MAP 181.—*Thelypteris madagascariensis*

Transkei, Natal, Swaziland, Transvaal, Zimbabwe, Mozambique, Malawi, Zaire, Kenya, Uganda, Tanzania, Sudan, Cameroun, Nigeria, Ghana, Liberia and Madagascar. Along shaded streambanks in forest and moist forest floors, c. 500–1 700 m in Southern Africa and 2 250 m in Kenya. Map 181.

Vouchers: *Medley Wood* s.n. (NH; PRE; SAM); *Schelpé* 6008 (BOL); *Wager* s.n. (PRE).

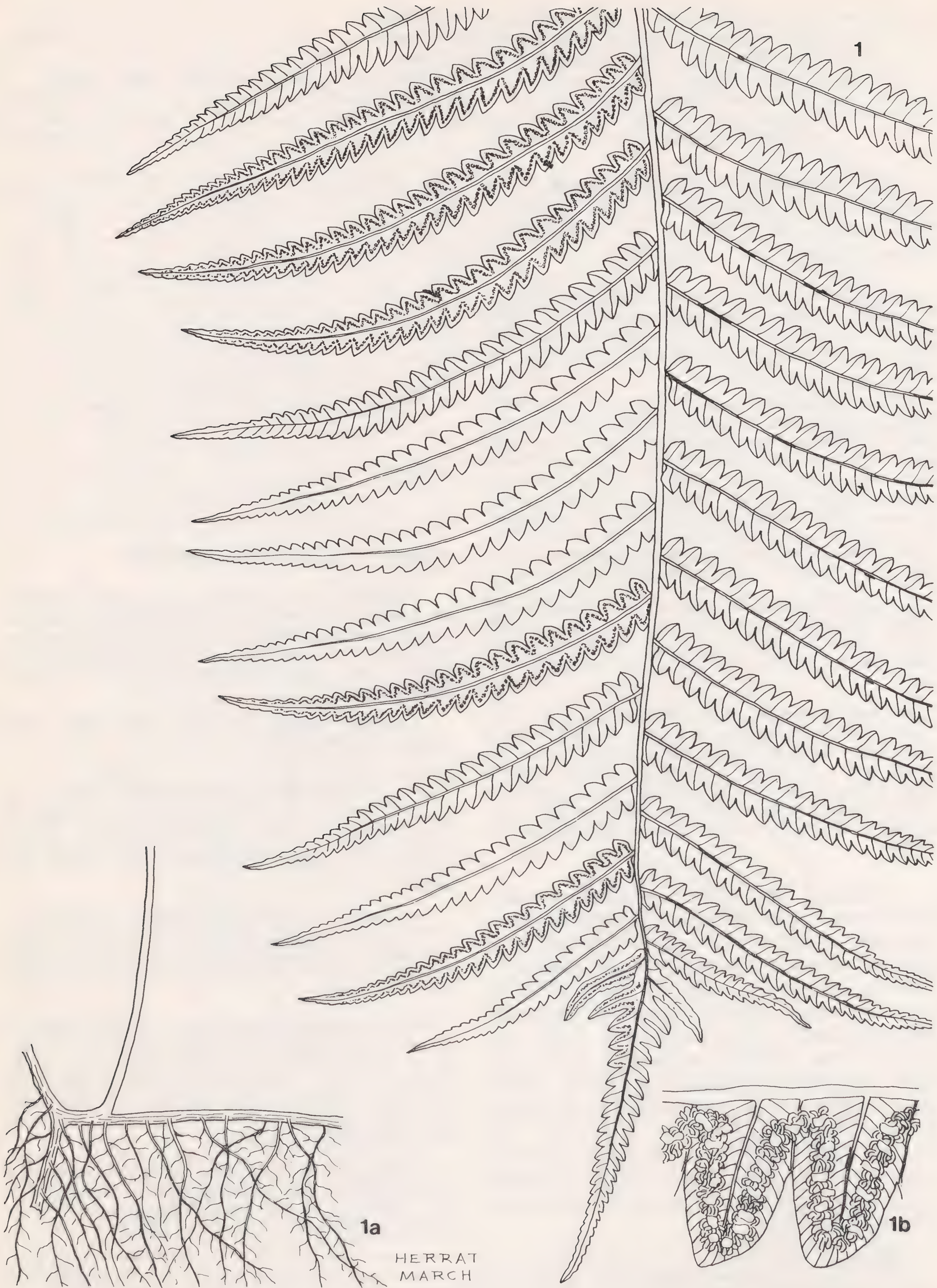
2. ***Thelypteris interrupta* (Willd.) K.**  
*Iwats.* in JI Jap. Bot. 38: 314 (1963); *Schelpé* in C.F.A. Pterid.: 157 (1977). Type: S. India, *Klein* s.n., Herb. Willdenow no. 19770 (B, holo.).

*Pteris interrupta* Willd. in Phytographia 13, t. 10 fig. 1 (1794). *Cyclosorus interruptus* (Willd.) H. Ito in Bot. Mag. Tokyo 51: 714 (1937), nomen tantum; Holttum in JI S. Afr. Bot. 40: 152 (1974); W. B. G. Jacobsen, Ferns Sthn Afr. 396, t. 299 (1983).

*Polypodium tottum* Thunb., Prodr. 172 (1800). *Thelypteris totta* (Thunb.) *Schelpé* in JI S. Afr. Bot. 29: 91 (1963), op. cit. 31: 267 (1965); in F.Z. Pterid.: 198, t. 55F (1970). *Cyclosorus tottus* (Thunb.) *Pichi-Sermolli* in Webbia 23: 173 (1968); Holttum in JI S. Afr. Bot. 40: 152 (1974). Type: Cape Province, Worcester Division, Brandvlei, Herb. Thunberg (UPS, holo.!).

*Aspidium ecklonii* Kunze in Linnaea 10: 546 (1836). Syn-types: Cape Province, Uitenhage Division, Zwartkops rivier, *Ecklon* s.n. (LZ†); Transkei, between the Umtendu and Umsimkulu Rivers, *Drège* s.n. (LZ†; BM!).







*Nephrodium plantianum* Pappe & Raws., Syn. Fil. Afr. Austr. 14 (1858). *Aspidium plantianum* (Pappe & Raws.) Kuhn, Fil. Afr. 139 (1868). Type: Natal, *Plant* 341 (Type not found).

*Aspidium goggilodus* Schkuhr, Krypt. Gew. 1: 193, t. 33c (1809). *Polystichum goggilodus* (Schkuhr) Gaud. in Freyc., Voy. Bot. 326 (1827). *Cyclosorus goggilodus* (Schkuhr) Link, Hort. Berol. 2: 128 (1833). *Dryopteris gongylodes* (Schkuhr) Kuntze, Rev. Gen. 2: 811 (1891); Sim, Ferns S. Afr. edn 2: 97, t. 13 (1915). *Thelypteris gongylodes* (Schkuhr) Small, Ferns S.E. States 248 (1938). Type: British Guiana, Herb Swartz (S, holo.).

Rhizome widely creeping, set with sparse blackish, narrowly ovate acute, entire rhizome-scales up to 1,3 mm long. *Fronds* spaced up to 120 mm apart, erect, firmly herbaceous to thinly coriaceous, non-proliferous; *stipe* pale or greyish brown, darker and set with scales basally, otherwise glabrous, up to 0,6 m long; *lamina* oblong-lanceolate, up to 0,84 × 0,3 m, apex shortly acuminate, basal pinnae not reduced; *pinnae* very narrowly oblong, shallowly incised into quadrate lobes up to 7 mm broad, upper surface subglabrous, lower surface set with scattered hairs; basal pair of *veins* anastomosing well below sinus. *Sori* circular, up to 18 per lobe; *indusium* c. 1 mm in diameter, densely pilose with white hairs. Fig. 70.

Cape Province, Transkei, Natal, Swaziland, Transvaal, Botswana, Zimbabwe, Mozambique, Malawi, Zambia, Angola, Zaire, Kenya, Tanzania, Ethiopia, Sudan, Chad, Cameroun, Algeria, Senegal, Mafia Island, Zanzibar, Pemba and Mauritius. Also Gambia and Madagascar (Alston, 1959). Riverbanks, swamps and other marshy areas, from near sea level in Natal to 1 300 m in the eastern districts of Zimbabwe. Map 182.

Vouchers: Rogers 639 (GRA; PRE); Schütte 35 (BM; BOL); 57 (BM; BOL); 68 (BM; BOL); Smith 1558 (BOL; SRGH); Strey 8234 (BOL; NH; NU).

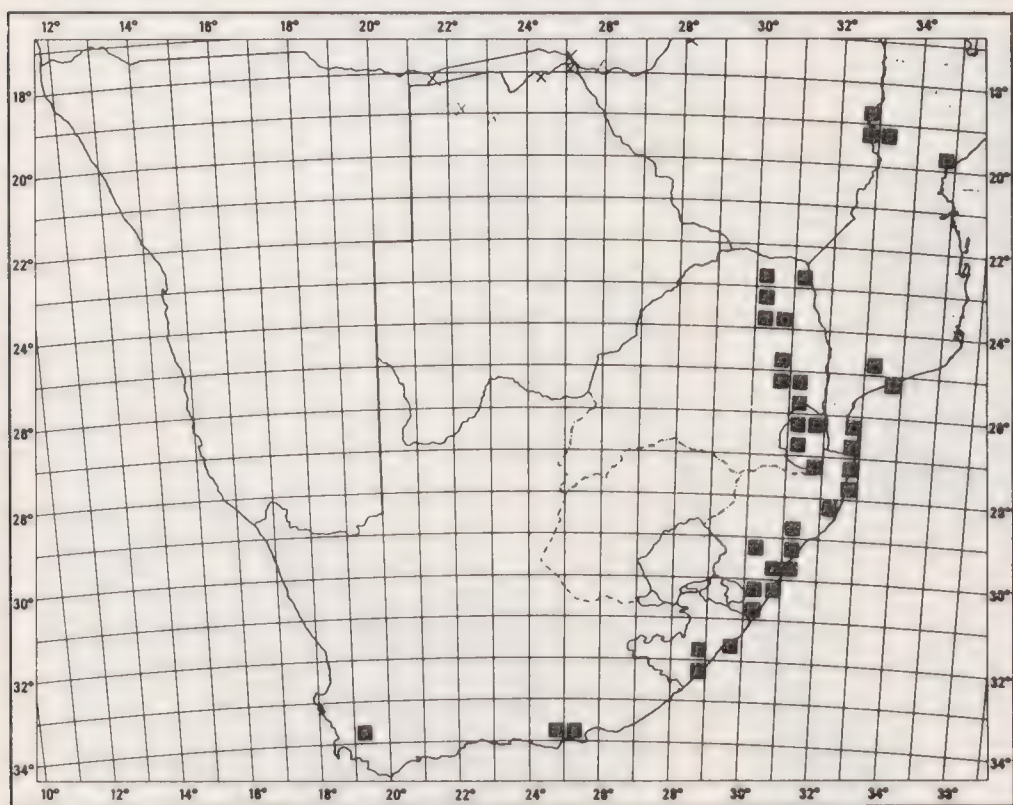
3. *Thelypteris confluens* (Thunb.) Morton in Contr. U.S. Nat. Herb. 38: 71 (1967); Launert in F.S.W.A. 10: 2 (1969); Schelpe in F.Z. Pterid.: 190 (1970); Holttum in Jl S. Afr. Bot. 40: 150 (1974); Schelpe in C.F.A. Pterid.: 155 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 395, t. 298 (1983). Type: Cape Province, Cape Peninsula, Herb. Thunberg (UPS, holo.!).

*Pteris confluens* Thunb., Prodr. 171 (1800).

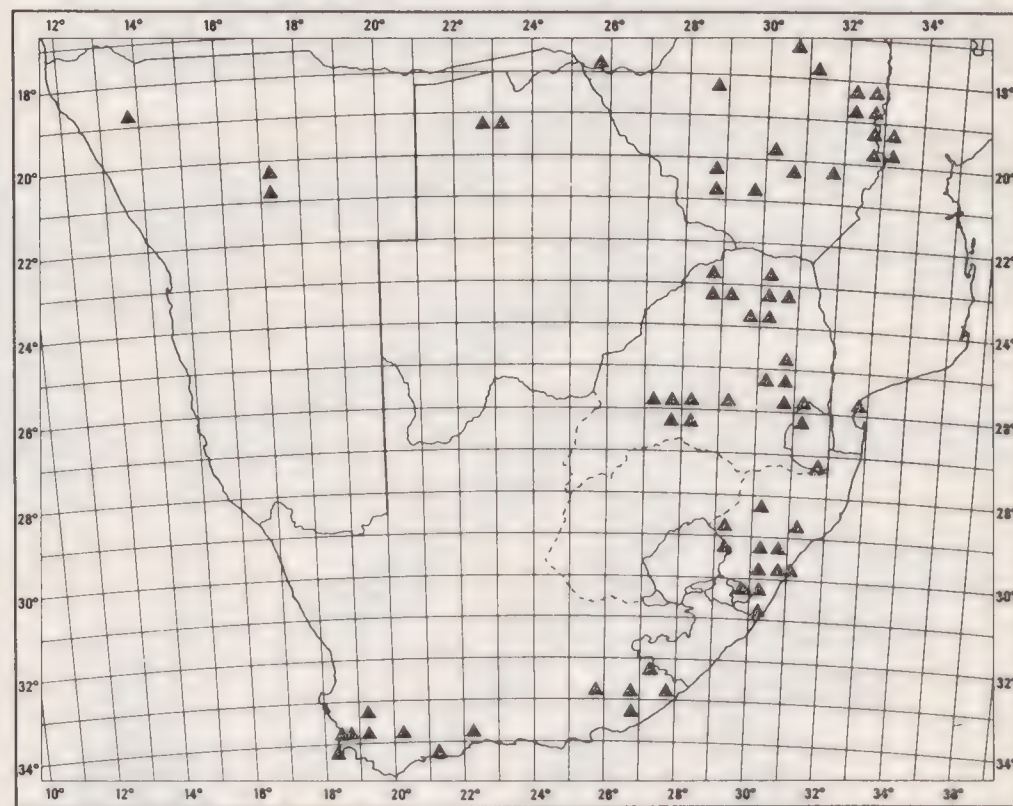
*Aspidium thelypteris* var. *squamigerum* Schlechtd., Adumbr. 23, t. 11 (1825). *Aspidium squamigerum* (Schlechtd.) Fée, Mém. Fam. Foug. 8: 104 (1857). *Lastrea thelypteris* var. *squamigera* (Schlechtd.) Bedd., Handb. Ferns Brit. Ind., Suppl. 54 (1892). *Dryopteris thelypteris* var. *squamigera* (Schlechtd.) C. Chr., Ind. Fil. 297 (1905). *Thelypteris palustris* var. *squamigera* (Schlechtd.) Weath. in Contr. Gray Herb. Harv. n.s. 73: 40 (1924). *Thelypteris squamigera* (Schlechtd.) Ching in Bull. Fan Memor. Inst. Biol., Bot. 6: 329 (1936). Syntypes: Cape Province, near Hex River, *Mund & Maire* s.n., *Bergius* s.n. (?HAL).

*Dryopteris thelypteris* sensu Sim, Ferns S. Afr. edn 2: 101, t. 16 (1915).

Rhizome widely creeping, set with dark brown, ovate, somewhat undulate rhizome-scales up to 2 mm long, becoming black and subglabrous with age. *Fronds* spaced up to 50 mm apart, erect, very firmly herbaceous, non-proliferous; *stipe* pale brown for most of its length, glabrous, up to 0,45 m long; *lamina*



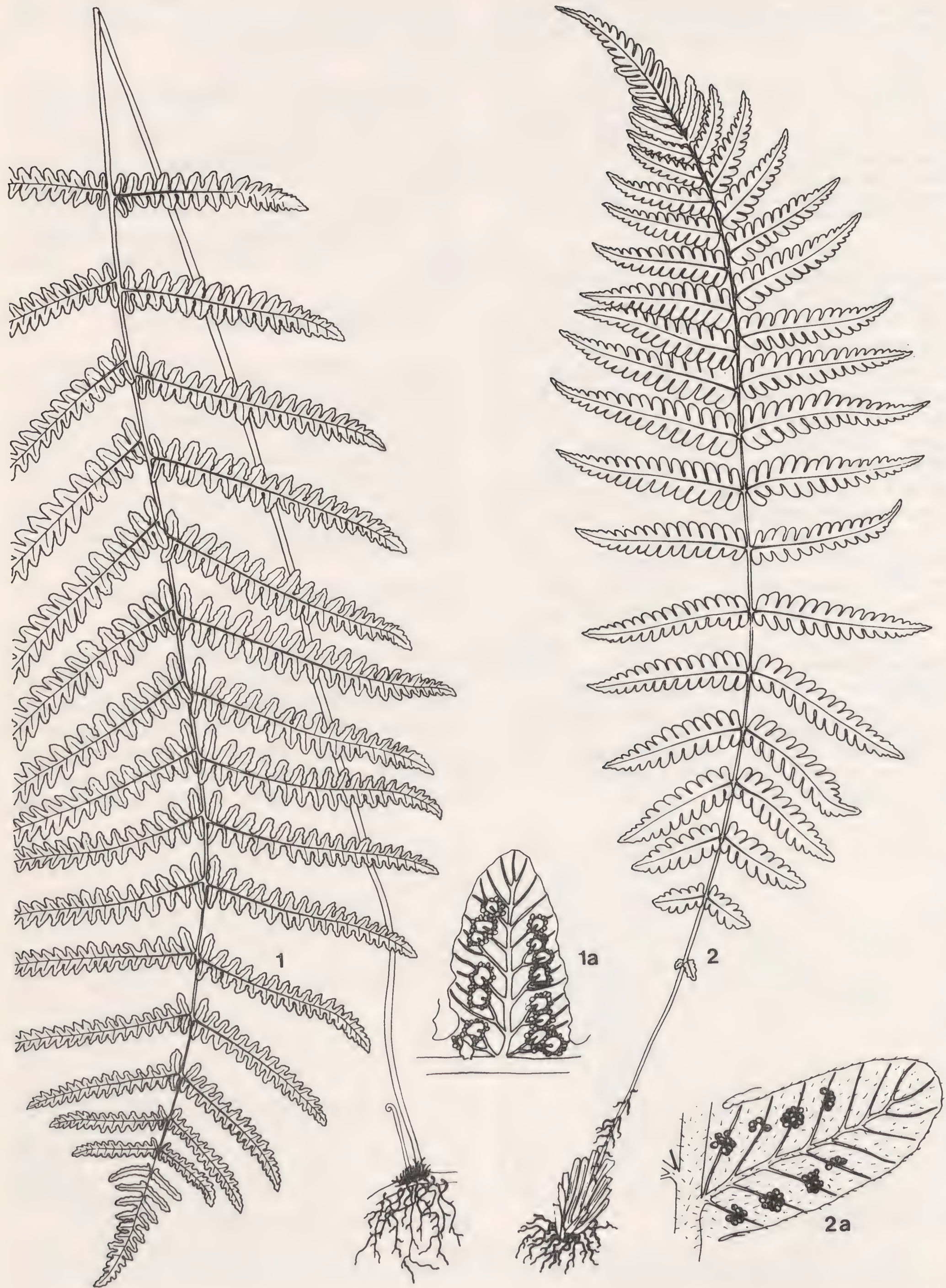
MAP 182.—*Thelypteris interrupta*



MAP 183.—*Thelypteris confluens*

FIG. 70.—1, *Thelypteris interrupta*, part of frond, × 0,6; 1a, stipe base and portion of rhizome, × 0,6; 1b, detail of lower surface of pinna lobes, × 3,6 (Rodin 4129).







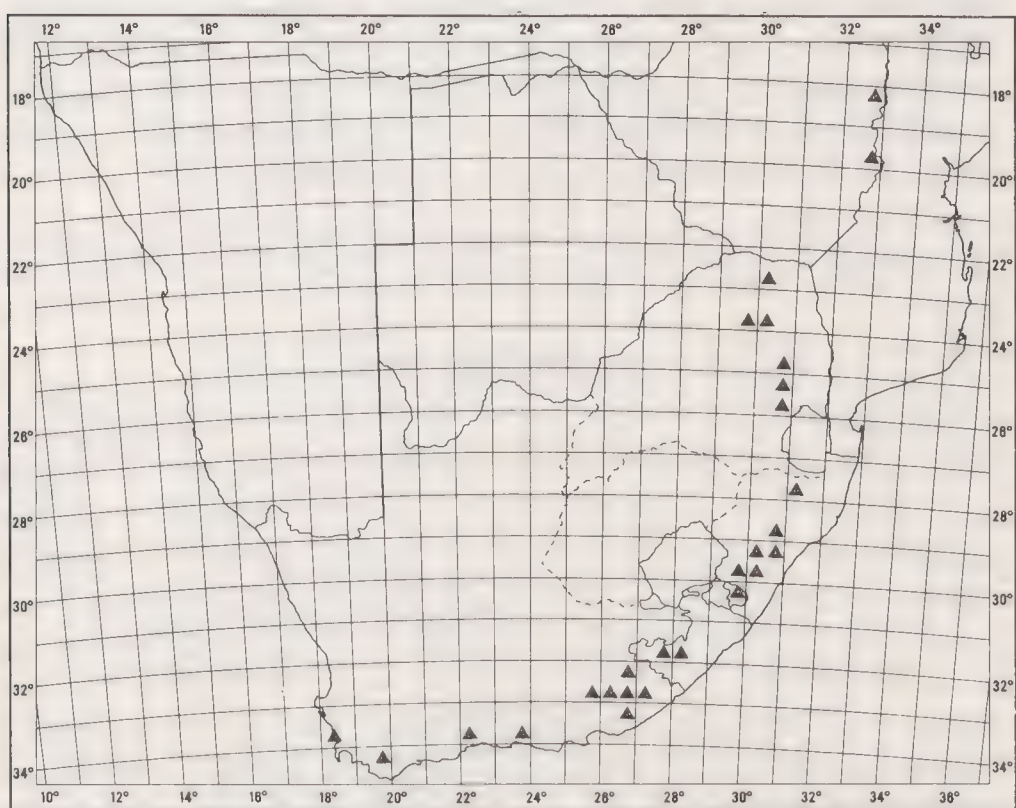
lanceolate to broadly lanceolate, up to  $0,5 \times 0,21$  m, apex acute, deeply bipinnatifid, basal pinnae slightly reduced; *pinnae* very oblong-lanceolate, acute, deeply pinnatifid; *costa* set with pale brown ovate scales below, glandular or thinly pilose. *Sori* circular, up to 18 per lobe, medial; *indusium* glabrous, up to 0,5 mm in diameter. Fig. 71: 1.

Widespread throughout Southern Africa, Zimbabwe, Mozambique, Malawi, Zambia, Angola, Zaire, Kenya, Uganda, Burundi, Tanzania, Sudan, Madagascar, as well as Australia and New Zealand. Marshy areas and swampy streambanks, 60–1 000 m in Southern Africa, 2 000 m in tropical Africa. Map 183.

Vouchers; *Fisher* 937 (NH; NU; PRE); *Schelpé* 4817 (BM; BOL; MO); *Sim* s.n. (BOL; PRE; S); *Wasserfall* 99 (NBG; PRE).

**4. *Thelypteris pozoi* (Lagasca) Morton** in Bull. Soc. bot. Fr. 106: 234 (1959); *Schelpé* in Jl S. Afr. Bot. 31: 268 (1965); in F.Z. Pterid.: 199, t. 55G (1970). Type: Northern Spain, *Del Pozo* s.n., Herb. Swartz (S, iso.!).

*Hemionitis pozoi* Lagasca, Nov. Gen. et Sp. 33 (1816). *Gymnogramma pozoi* (Lagasca) Desv. in Mém. Soc. Linn., Paris 6: 216 (1827). *Ceterach pozoi* (Lagasca) A. Br. ex Milde in Bot. Ztg 1886: 310 (1886), nom., excl. descr. *Pleurosorus pozoi* (Lagasca) Trevisan in Atti Soc. ital. Sci. nat. 17: 256 (1875). *Leptogramma pozoi* (Lagasca) Heywood in Feddes Repert. 64: 19 (1961). *Stegnogramma pozoi* (Lagasca) K. Iwats. in Acta phytotax. et geobot. 19: 124 (1963); Holttum in Jl S. Afr. Bot. 40: 149 (1974); W. B. G. Jacobsen, Ferns Sthn Afr. 393, t. 297 (1983).



MAP 184.—*Thelypteris pozoi*

*Polypodium tottum* Willd. in L., Sp. Pl. edn 4, 5: 201 (1810), non Thunb. (1800).

*Gymnogramma totta* Schlechtd., Adumbr. 15, t. 6 (1825). *Grammitis totta* (Schlechtd.) Presl, Tent. Pterid.: 209, t. 9 fig. 4 (1836), reimpr. in Abh. K. Böhm. Ges. Wiss., ser. 4, 5: 209, t. 9 fig. 4 (1837). *Leptogramma totta* (Schlechtd.) J. Sm. in Hook., J. Bot. 4: 52 (1842). *Phegopteris totta* (Schlechtd.) Mett. in Abh. senckenb. naturforsch. Ges. 2: 302 (1858), reimpr. in Mett., Farngatt. 4: 302, n. 31 (1858). *Aspidium tottum* (Schlechtd.) Engl., Hochgebirgsfl. Trop. Afr. 99 (1892). *Nephrodium tottum* (Schlechtd.) Diels in Engl. & Prantl, Pflanzenfam. 1, 4: 170, t. 91G (1899). *Lastrea totta* (Schlechtd.) Ohiwi in Bull. Nat. Sci. Mus. Tokyo, ser. 2, 3: 98 (1956). Type: Cape Peninsula, *Mundt & Maire* s.n. (B, holo.).

*Polypodium africanum* Desv. in Mém. Soc. Linn., Paris 6: 239 (1827). *Dryopteris africana* (Desv.) C. Chr., Ind. Fil. 251 (1905); *Sim*, Ferns S. Afr. edn 2: 102, t. 23 (1915). *Aspidium africanum* (Desv.) Aschers. & Graebn., Syn. Mitteleurop. Fl. edn 2, 1: 28, 153 (1912). *Leptogramma africana* (Desv.) Nakai ex Mori, Enum. Pl. Corea 13 (1922). *Lastrea africana* (Desv.) Ching in Contr. Biol. Lab. Sci. Soc. China 9: 36 (1933). *Lastrea africana* (Desv.) Copel., Gen. Fil. 138 (1947). Type: South Africa Herb. Willdenow no. 19697 (B, holo.!).

Rhizome erect, set with dark brown, lanceolate, ciliate rhizome-scales c. 1 mm long. *Fronde*s tufted, arching, softly herbaceous, non-proliferous; *stipe* pale brown, becoming darker basally, thinly pubescent with minute whitish hairs; *lamina* lanceolate to narrowly elliptic, up to  $340 \times 140$  mm, acute, lower pinnae somewhat reduced and deflexed; *pinnae* adnate, very narrowly oblong or attenuate, base truncate, incised about halfway to costa into quadrate, rounded, undulate lobes c. 4 mm broad, pilose on both surfaces; c. 6 pairs of *veins* per lobe, not anastomosing; *rhachis* pilose with short white hairs. *Sori* linear along veins, up to 1,5 mm long, exindusiate. Fig. 69: 1.

Cape Province, Transkei, Natal, Transvaal, Zimbabwe, Malawi, Zaire, Kenya, Uganda, Tanzania, Cameroun, Fernando Po, Madeira, Azores Islands and Spain. Moist shaded forest floors and streambanks, 100–1 800 m in Southern Africa, c. 2 500 m in Kenya. Map 184.

Vouchers: *Esterhuysen* 26568 (B; BM; BOL; MO); *Fisher* 938 (NH; NU; PRE); *Schelpé* 4345 (B; BOL; GH; K; M; P; S; US); *Schlechter* 6603 (GRA; K; PRE).

**5. *Thelypteris pulchra* (Bory ex Willd.)** *Schelpé* in Garcia de Orta, sér. Bot. 3: 54 (1976); in C.F.A. Pterid.: 151 (1977). Type: Réunion, *Bory* 81 (B, holo.).

FIG. 71.—1, *Thelypteris confluens*, part of plant,  $\times 0,6$ ; 1a, detail of lower surface of pinna lobe,  $\times 3,6$  (*Braithwaite* 137). 2, *Thelypteris bergiana*, part of plant,  $\times 0,6$ ; 2a, detail of lower surface of pinna lobe,  $\times c. 6$  (*Schelpé* 5670b).

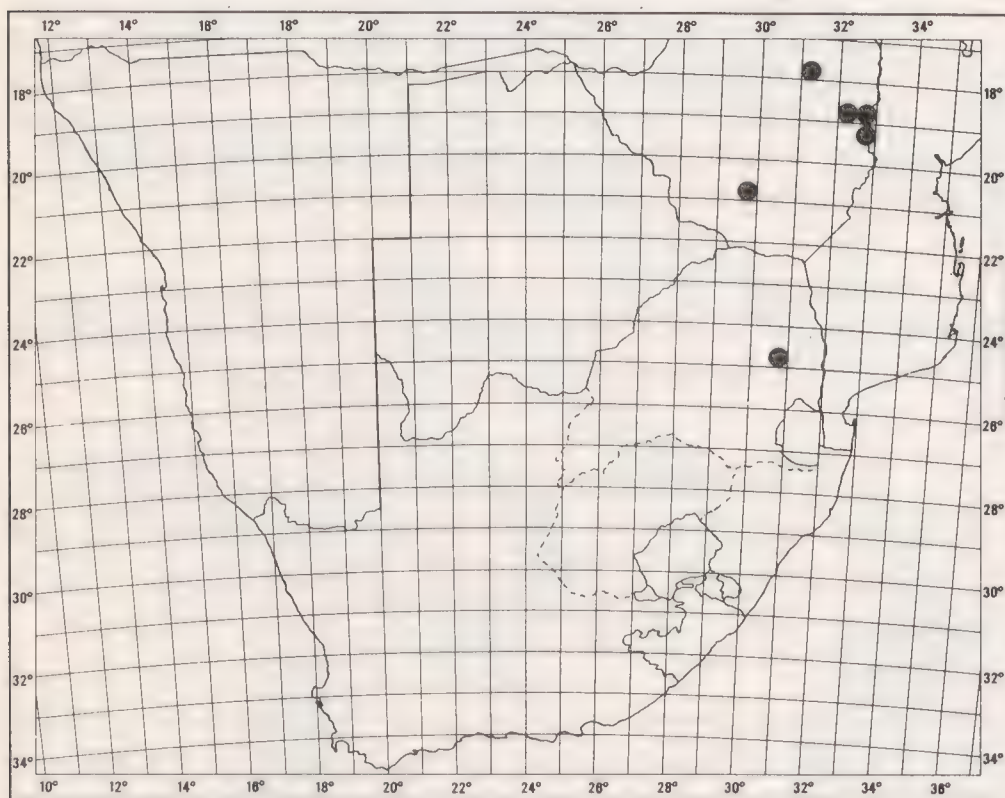


*Aspidium pulchrum* Bory ex Willd. in L., Sp. Pl. edn 4, 5: 253 (1810). *Nephrodium pulchrum* (Bory ex Willd.) Desv. in Mém. Soc. Linn., Paris 6: 256 (1827). *Lastrea pulchra* (Bory ex Willd.) Presl, Tent. Pterid. 75 (1836). *Pseudocyclosorus pulcher* (Bory ex Willd.) Holttum in Jl S. Afr. Bot. 40: 138 (1974); W. B. G. Jacobsen, Ferns Sthn Afr. 385, t. 288 (1983).

*Nephrodium longicuspe* Bak. in J. Linn. Soc., Bot. 16: 202 (1877). *Aspidium longicuspe* (Bak.) Kuhn in Von Deck., Reisen, Bot. 3, 3: 65 (1879). *Dryopteris longicuspis* (Bak.) C. Chr., Ind. Fil. 275 (1905). *Lastrea longicuspis* (Bak.) Pichi-Sermolli in Webbia 23: 175 (1968). *Thelypteris longicuspis* (Bak.) Schelpe in Jl S. Afr. Bot. 31: 262 (1965); in F.Z. Pterid.: 192, t. 55A (1970). Type: Madagascar, Gilpin s.n. (K).

Rhizome erect, up to 0,3 m tall, sometimes forming a short caudex, set with pale brown, ovate-acute, subentire rhizome-scales c. 4 mm long. *Fronde*s erect, arching, non-proliferous; *stipe* matt-brown, thinly pubescent with minute white hairs; *lamina* firmly membranous, oblong, up to 1,5 × 0,66 m, deeply 2-pinnatifid, abruptly decrescent basally into a long series of up to 8 pairs of pinnae reduced to less than 25 mm long; *pinnae* very narrowly oblong or attenuate, usually ending in a linear crenate apex, very deeply pinnatifid into very narrowly oblong, falcate, acute lobes up to 18 × 4 mm, densely pubescent along costa with white hairs and with scattered white hairs along veins above, glandular on costa, costules and surface with occasional short hairs along costa below; *veins* not anastomosing; *rhachis* stramineous matt-brown, glabrous. *Sori* minute, up to 25 per lobe, borne half-way between costa and margin; *indusium* glandular, 0,4 mm in diameter.

Rare in eastern Transvaal; distributed through Zimbabwe, Malawi, Angola, Uganda, Tanzania, Ethiopia and Cameroun, as well as Madagascar and Mauritius. Stream-banks in light shade, 975–1 900 m. Map 185.



MAP 185.—*Thelypteris pulchra*

Voucher: Burrows 3109 (BOL).

6. *Thelypteris altissima* (Holttum) P. J. Vorster in Bothalia 12: 260 (1977). Type: Natal, head of Durban Bay, Buchanan 1036 (K, holo.!).

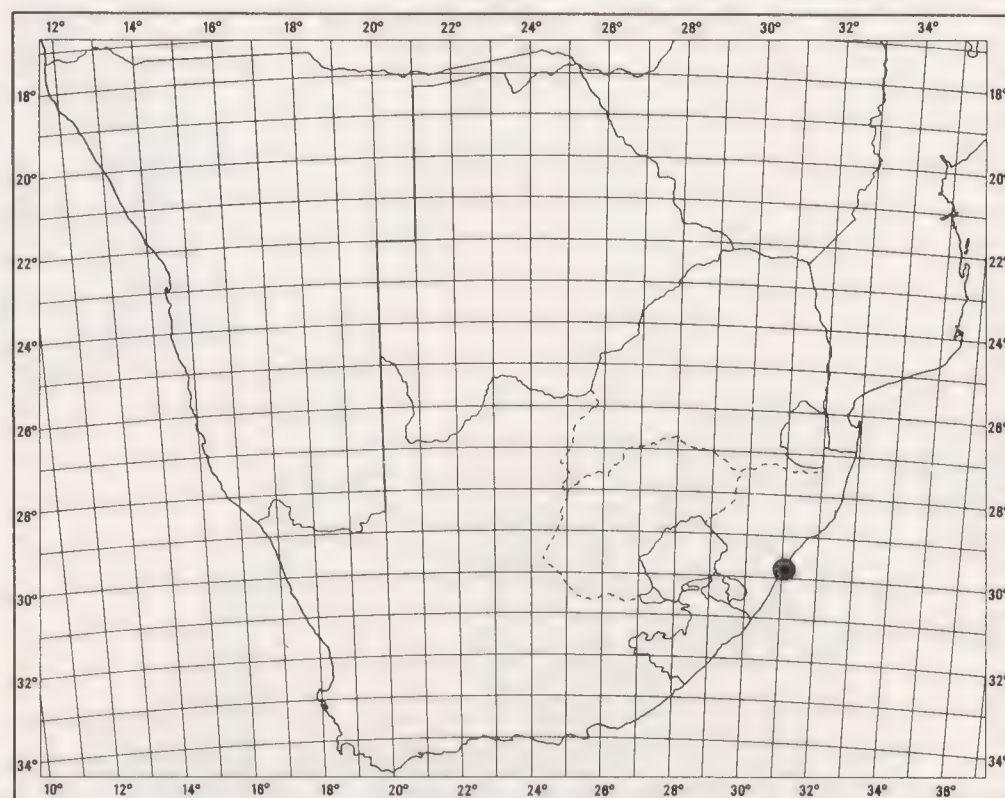
*Christella altissima* Holttum in Jl S. Afr. Bot. 40: 141 (1974); W. B. G. Jacobsen, Ferns Sthn Afr. 387 (1983).

Rhizome widely creeping. *Stipe* c. 0,4 m long, set with scales c. 10 × 15 mm. *Lamina* up to 2 m long, lowest 6 or more pairs of pinnae gradually decrescent with enlarged, acuminate, crenate, basal acroscopic lobes, lower surface thickly set with hairs 0,3–0,5 mm long; *pinnae* somewhat truncate basally, narrowly acuminate, up to 280–340 × 25–35 mm, lobed  $\frac{2}{3}$ – $\frac{3}{4}$  to costa into falcate obtuse lobes, costules 4,5–5,5 mm apart; *costae* pilose above (hairs 0,6 mm long), costules and veins set with hairs of the same length; *veins* 11- to 15-paired,  $1\frac{1}{2}$  pairs anastomosing, one pair joining at membrane in sinus. *Sori* medial, the lower supramedi- al, the lowermost not coalescing.

Only known from three collections, in swampy ground, at the head of Durban Bay in Natal. Map 186.

Vouchers: Buchanan 8 (K); 186 (K).

According to Holttum (1974), *T. altissima* differs from *T. dentata* (below) in its much larger size, more veins anastomosing, and in the presence of long acicular hairs on the stalks of many sporangia. Its known locality has been destroyed by development. In view of the fact that Holttum described the spores of *T. altissima* as abortive, this may have been a chance polyploid or hybrid population. The putative parentage given by Holttum (*T. afra* × *T. dentata*) is unlikely, as the nearest known populations of *T. afra* Reed are from northern Angola, Zaire and Uganda.



MAP 186.—*Thelypteris altissima*



7. ***Thelypteris dentata* (Forssk.) E. St. John** in Am. Fern J. 26: 44 (1936); Schelpe in Jl S. Afr. Bot. 31: 265 (1965); in F.Z. Pterid.: 197, t. 55C (1970); in C.F.A. Pterid.: 152 (1977). Type: Yemen, *Forsskal* 809 (C, holo.!—BM, photo.!; K!).

*Polypodium dentatum* Forssk., Fl. Aegypt.-Arab. cxxv, 185 (1775). *Dryopteris dentata* (Forssk.) C. Chr. in K. danske Vidensk. Selsk. Skr., Afd. 8, 6: 24 (1920). *Cyclosorus dentatus* (Forssk.) Ching in Bull. Fan Memor. Inst. Biol., Bot. 8: 206 (1938). *Christella dentata* (Forssk.) Holttum in Jl S. Afr. Bot. 40: 143 (1974); W. B. G. Jacobsen, Ferns Sthn Afr. 388, t. 290, 291 (1983).

*Dryopteris mollis* sensu Sim, Ferns S. Afr. edn 2: 96, t. 11 (1915).

Rhizome shortly creeping, set with dark brown, acuminate, entire, thinly pilose rhizome-scales up to 6 mm long. *Fronde*s closely spaced, arching, herbaceous, non-proliferous; *stipe* thinly pubescent and set with scales basally; *lamina* elliptic to narrowly elliptic, apex acuminate with a deeply pinnatifid terminal segment, basal 2–4 pairs of pinnae gradually decrescent; *middle pinnae* linear-lanceolate, caudate with a narrow, attenuate, subentire segment apically, deeply pinnatifid into oblong, slightly falcate, subentire lobes up to 5 mm broad; one pair or usually a pair and a single *vein* anastomosing at and below sinus. *Sori* circular, medial, up to 14 per lobe; *indusium* up to 1 mm in diameter, pilose with short white hairs. Fig. 72.

Eastern Cape Province, Transkei, Natal, Swaziland, Transvaal, Zimbabwe, Mozambique, Zambia, Angola, Zaire, Kenya, Uganda, Tanzania, Ethiopia, Sudan, Central African Republic, Cameroun, Equatorial Guinea, Nigeria, Benin, Ghana, Ivory Coast, Liberia, Sierra Leone, Cape Verde Islands, Canary Islands, Tenerife, Madeira, Azores Islands, Ascension Islands, Madagascar, Zanzibar, Socotra, Yemen. Pantropical. Forest floors and margins, 500–1 600 m. Map 187.

Vouchers: *Schelpe* 1667 (BM; NU); *Schütte* 59 (BM; BOL); *Strey* 879 (BOL; NH); *Taylor* 2513 (BOL; NBG).

8. ***Thelypteris chaseana* Schelpe** in Jl S. Afr. Bot. 31: 264, t. 1 e–f (1965); Launert in F.S.W.A. 10: 1 (1969); Schelpe in F.Z. Pterid.: 194 (1970); in C.F.A. Pterid.: 155 (1977). Type: South West Africa/Namibia, Otjiwarongo, Grosse Waterberg above Waterberg Station, *Schelpe* 4791 (BOL, holo.!; MO!).

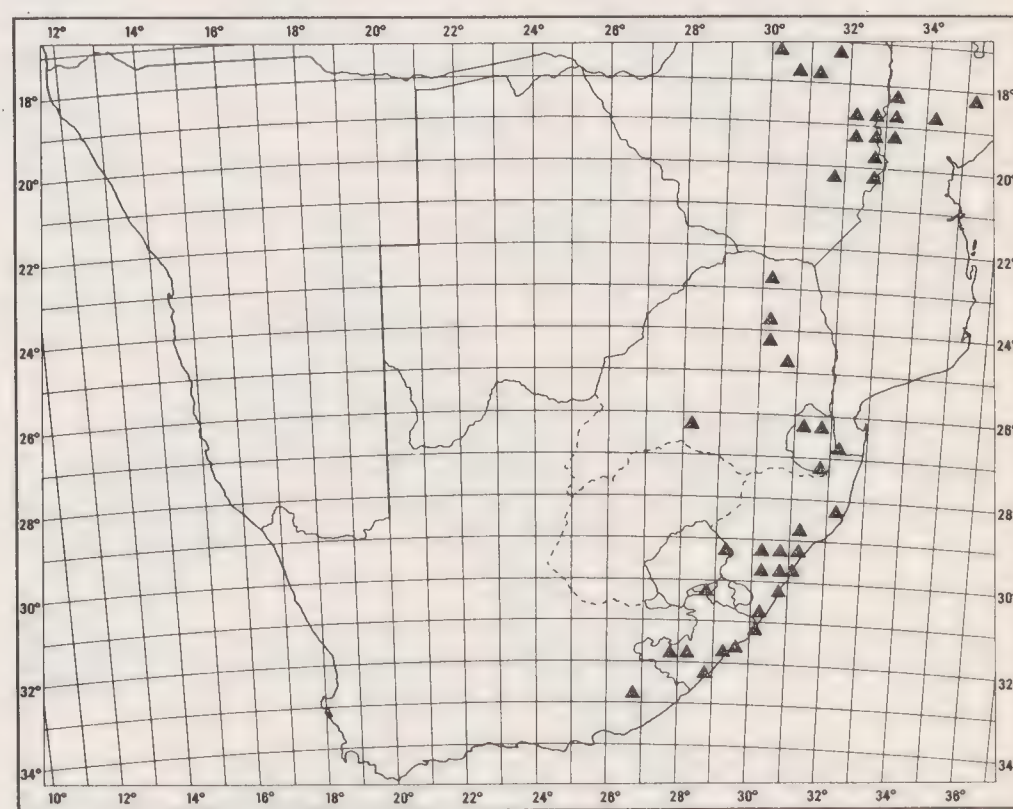
*Lastrea chaseana* (Schelpe) Pichi-Sermolli in Webbia 23: 175 (1968). *Christella chaseana* (Schelpe) Holttum in Jl S. Afr. Bot. 40: 148 (1974); W. B. G. Jacobsen, Ferns Sthn Afr. 392, t. 296 (1983).

Rhizome creeping, set with brown, lanceolate, acuminate, entire, somewhat pilose rhizome-scales up to 11 mm long. *Fronde*s spaced up to 10 mm apart, herbaceous, non-

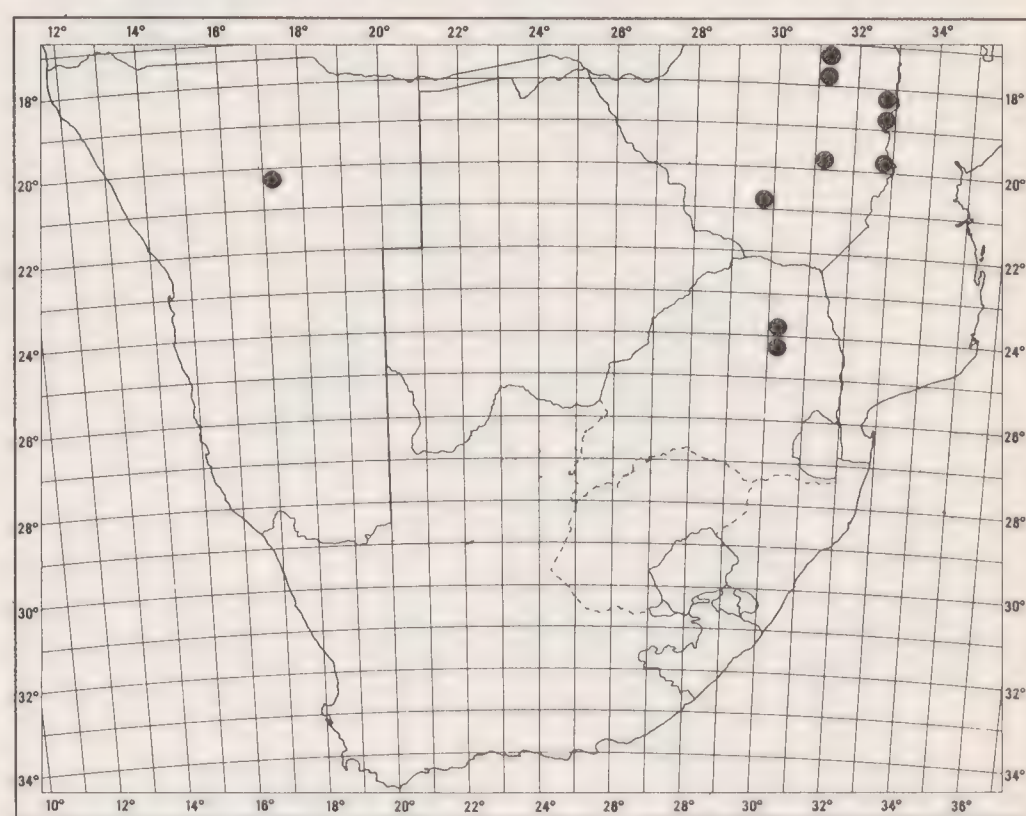
proliferous; *stipe* pale brown to stramineous, up to 0,63 m long, pubescent with minute white hairs and set with lanceolate scales c.  $10 \times 1,5$  mm basally; *lamina* narrowly elliptic to lanceolate, up to  $0,7 \times 0,2$  m, acuminate with a deeply pinnatifid terminal segment, with up to 3 pairs of basal pinnae reduced and deflexed; *middle pinnae* very narrowly oblong-acuminate, basal acroscopic lobes enlarged, frequently overlapping rhachis, caudate with a narrow subentire segment apically; *veins* free or anastomosing, meeting sinus or in a membrane extending down from sinus. *Sori* circular, medial, up to 16 per lobe; *indusium* c. 1 mm in diameter, pilose with long white hairs.

South West Africa/Namibia, Transvaal, Zimbabwe, Malawi, Zambia, Angola, Zaire, Kenya and Tanzania. Forest floors and shaded or exposed streambanks, 1 200–1 800 m. Map 188.

Vouchers: *Rodin* 2593 (BOL; K); *Schelpe* 6025 (BOL).



MAP 187.—*Thelypteris dentata*



MAP 188.—*Thelypteris chaseana*





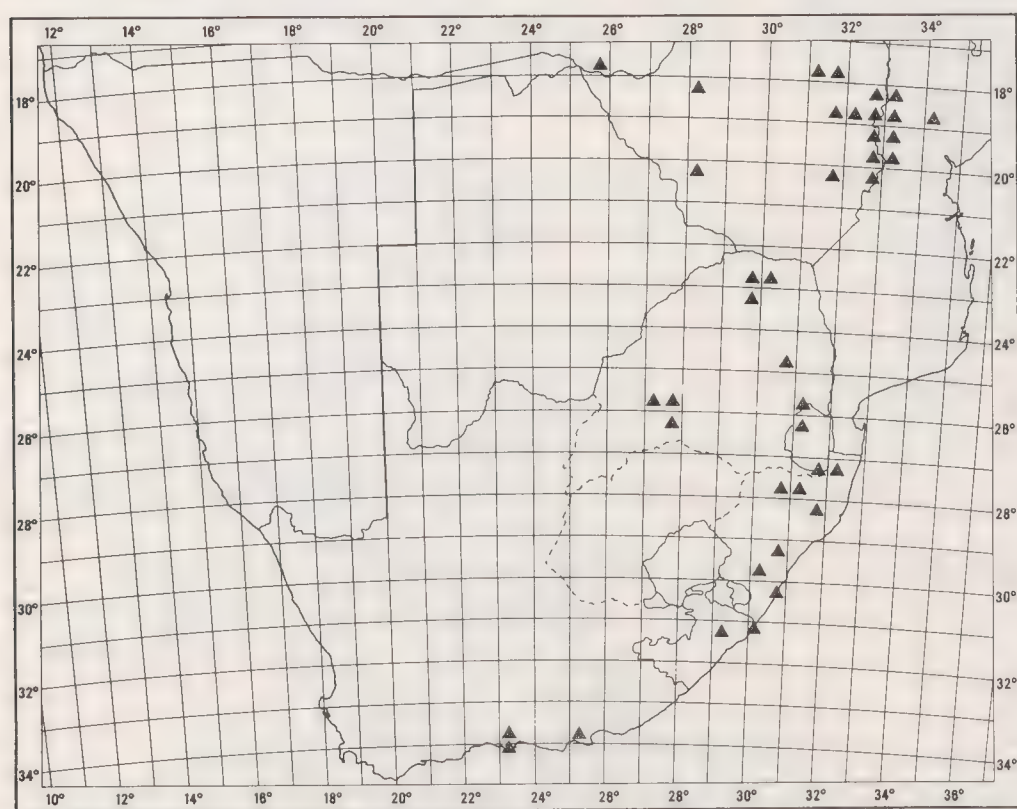


9. ***Thelypteris gueinziana* (Mett.) Schelpe** in Jl S. Afr. Bot. 31: 262, 244, t. 1 a (1965), as *gueintziana*; in F.Z. Pterid.: 194 (1970); in C.F.A. Pterid.: 154 (1977). Type: Port Natal, *Gueinzius* s.n. (B, holo.!).

*Aspidium gueintzianum* Mett. in Abh. senckenb. naturforsch. Ges. 2: 367 (1857), reimpr. in Mett., Farngatt. 4: 368, n. 201 (1858). *Lastrea gueinziana* (Mett.) T. Moore, Ind. Fil. 93 (1858). *Nephrodium gueintzianum* (Mett.) Hieron. in Bot. Jb. 28: 341 (1900). *Christella gueinziana* (Mett.) Holtt. in Jl S. Afr. Bot. 40: 147 (1974); W. B. G. Jacobsen, Fern Sthn Afr. 391, t. 294, 295 (1983).

Rhizome erect, set with brown, ovate, acute, entire rhizome-scales up to 4 mm long. *Fronds* tufted, arching, firmly herbaceous, non-proliferous; *stipe* stramineous, thinly pubescent with minute whitish hairs; *lamina* elliptic, up to  $0,34 \times 0,18$  m, with an acute, deeply pinnatifid apex, basal two pairs of pinnae somewhat reduced and deflexed; *pinnae* narrowly oblong, attenuate, caudate with a long, narrow, crenate segment apically, deeply pinnatifid, basal acroscopic pinnule frequently enlarged, pubescent with straight whitish hairs up to 1 mm long on both surfaces; *veins* free, basal pair of each lobe free or meeting at sinus. *Sori* medial, up to 16 per lobe; *indusium* orange, thickly membranous, up to 0,7 mm in diameter, pilose with white hairs.

Cape Province, Transkei, Natal, Swaziland, Transvaal, Zimbabwe, Mozambique, Malawi, Zambia, Angola, Zaire, Kenya, Tanzania and Sudan. Shaded and exposed streambanks and forest undergrowth, 1 100–1 700 m in Southern Africa, up to 1 270 m in tropical Africa. Map 189.



MAP 189.—*Thelypteris gueinziana*

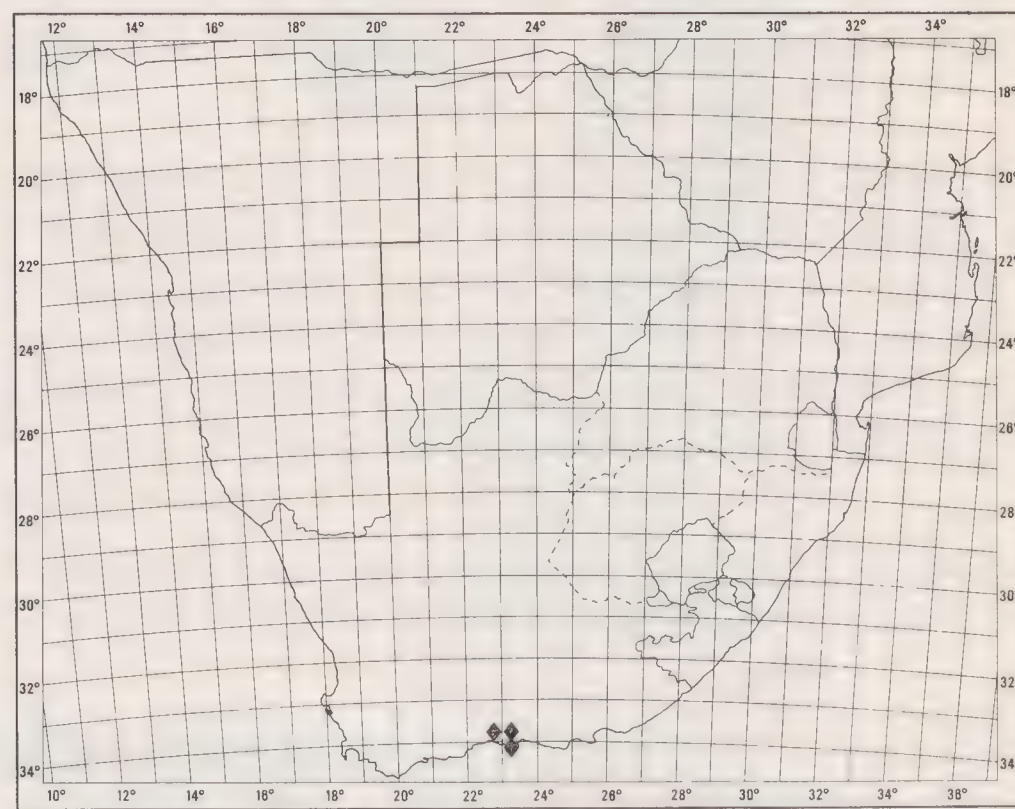
Vouchers: *Schelpe* 6015 (B; BOL; C; K; M; MO; P; PR; PRE; S); *Strey* 6022 (BOL; NH; NU); *Taylor* 1147 (BOL).

10. ***Thelypteris knysnaensis* N.C. Anthony & Schelpe** in Contr. Bolus Herb. 10: 155 (1982). Type: George, Groeneweidebos, *Geldenhuis* 609 (BOL, holo.!).

Rhizome erect. *Fronds* tufted, arching, thinly herbaceous, non-proliferous; *stipe* light brown, thinly pubescent with minute whitish hairs, dark brown and set with lanceolate, acuminate, somewhat pilose scales basally; *lamina* elliptic, c.  $0,46 \times 0,16$  m, with an attenuate, deeply pinnatifid apex, five basal pairs of pinnae reduced and deflexed; *middle pinnae* linear-attenuate, caudate with a narrow, crenate segment apically, deeply pinnatifid into oblong, rounded pinnules, basal acroscopic pinnule largest and overlapping rhachis, pubescent along costae, costules and lower lamina surface with straight whitish hairs up to 1 mm long; *veins* not anastomosing. *Sori* medial to submarginal; *indusium* thinly membranous, brown, c. 0,7 mm in diameter, set with minute stalked yellow glands and whitish hairs.

Known only from the indigenous forests of the George-Knysna area of southern Cape Province. Shady, damp localities. First recognised as distinct by Dr B. S. Parris. Map 190.

Vouchers: *Geldenhuis* 400 (BOL); *Michell* s.n. (BOL 14491); *Parris & Croxall* 7423 (BOL).



MAP 190.—*Thelypteris knysnaensis*



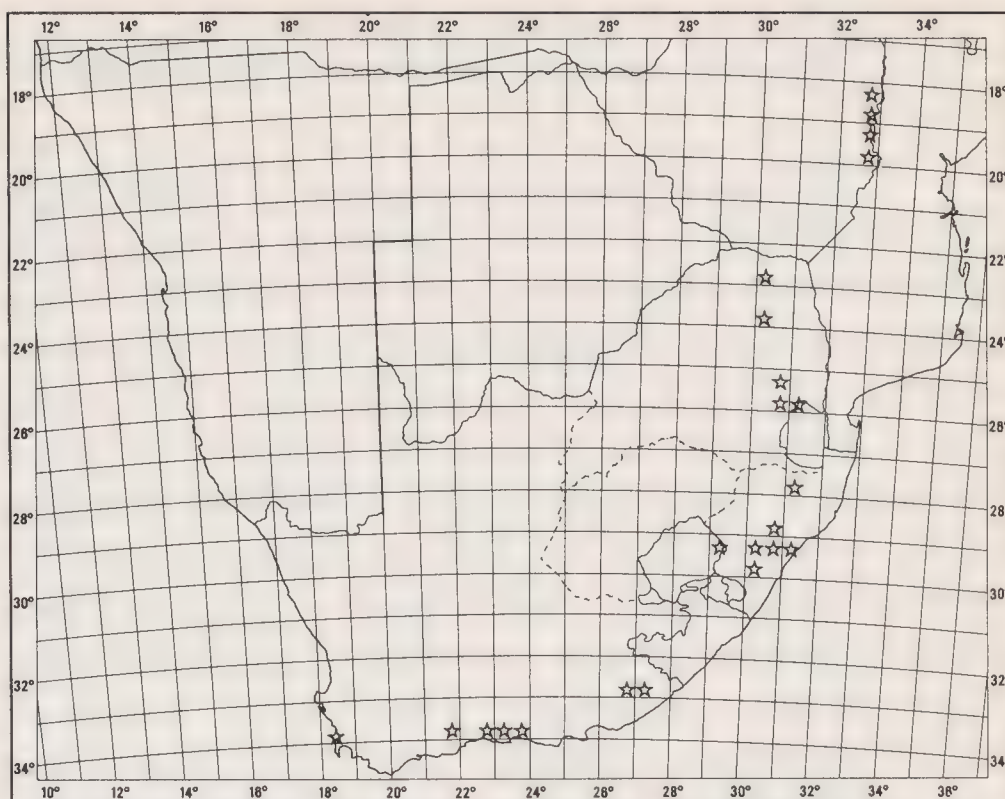




11. ***Thelypteris bergiana* (Schlecht.) Ching** in Bull. Fan Memor. Inst. Biol., Bot. 10: 251 (1941); Schelpe in Jl S. Afr. Bot. 31: 261 (1965); in F.Z. Pterid.: 193, t. 55B (1970); in C.F.A. Pterid.: 150 (1977). Syntypes: Cape Province, Kirstenbosch, *Bergius* s.n., *Mundt & Maire* s.n. (Types not found).

*Polypodium bergianum* Schlecht., Adumbr. 20, t. 9 (1825). *Aspidium bergianum* (Schlecht.) Mett. in Abh. senckenb. naturforsch. Ges. 2: 363 (1858), réimpr. in Mett., Farngatt. 4: 78, n. 188 (1858). *Lastrea bergiana* (Schlecht.) T. Moore, Ind. Fil. 86 (1858). *Nephrodium bergianum* (Schlecht.) Bak. in Hook. & Bak., Syn. Fil. 269 (1867). *Dryopteris bergiana* (Schlecht.) Kuntze, Rev. Gen. 2: 812 (1891); Sim, Ferns S. Afr. edn 2: 93, t. 10 (1915). *Dryopteris prolixa* var. *bergiana* (Schlecht.) Alston apud Gilliland in Jl S. Afr. Bot. 4: 149 (1938). *Amauropelta bergiana* (Schlecht.) Holttum in Jl S. Afr. Bot. 40: 133 (1974); W. B. G. Jacobsen Ferns Sthn Afr. 383, t. 286 (1983).

Rhizome erect, set with pale brown, subentire, sparsely ciliate rhizome-scales up to 8 mm long. *Fron*ds tufted, arching, herbaceous, non-proliferous; *stipe* greyish brown, thinly pubescent with minute white hairs and set with scales basally; *lamina* narrowly elliptic, up to 0,95 × 0,25 m, deeply 2-pinnatifid, apex acuminate with deeply pinnatifid terminal segment, basal 4 or 5 pairs of pinnae decrescent and deflexed; *middle pinnae* narrowly oblong-acuminate, caudate with a subentire segment apically, pubescent along costa, costules and veins above



MAP 191.—*Thelypteris bergiana*

with straight hairs, the lower costae, costules and lamina surface pilose with short, hooked, whitish hairs; *veins* quite free. *Sori* medial to submarginal, up to 14 per lobe; *indusium* minute. Fig. 71: 2.

Cape Province, Natal, Swaziland, Transvaal, Zimbabwe, Mozambique, Malawi, Zambia, Zaire, Angola, Kenya, Uganda, Tanzania, Ethiopia, Sudan, Cameroun and Fernando Po. Streambanks in forest and moist localities along forest margins, 100–1 800 m in Southern Africa, c. 2 500 m in Kenya. Map 191.

Vouchers: *Burrows* 1458 (BOL; NBG); *Esterhuysen* 26565 (B; BM; BOL; MO; PRE).

## 2. MACROTHELYPTERIS

***Macrothelypteris* (H. Itô) Ching** in Acta Phytotax. Sinica 8: 308 (1963); Holttum in Jl S. Afr. Bot. 40: 126 (1974). Type species: *M. oligophlebia* (Bak.) Ching (= *Nephrodium oligophlebium* Bak.).

Rhizome short, creeping or suberect, set with narrow rhizome-scales somewhat thickened basally and with marginal and superficial acicular and capitate hairs. *Scales* at stipe base similar to rhizome-scales, those on rhachis always with an acicular hair-tip. *Lamina* 2-pinnate to 4-pinnatifid with somewhat adnate pinnules, lowest pinnae not conspicuously reduced; lamina hairs slender, acicular or short and capitate, or both, some long slender multicellular hairs always present. *Sori* not terminal on veins, always small, mostly with a small but persistent indusium often hidden by mature sporangia. *Spores* with a somewhat winged perispore.

A genus of about 9 species distributed through the warmer parts of mainland Asia, Malaysia, NE Australia, the islands of the Pacific and the Mascarene Islands. *M. torresiana* has been introduced to tropical and subtropical America and subtropical Africa.

***Macrothelypteris torresiana* (Gaud.) Ching** in Acta Phytotax. Sinica 8: 310 (1963); Holttum in Jl S. Afr. Bot. 40: 126 (1974); W.

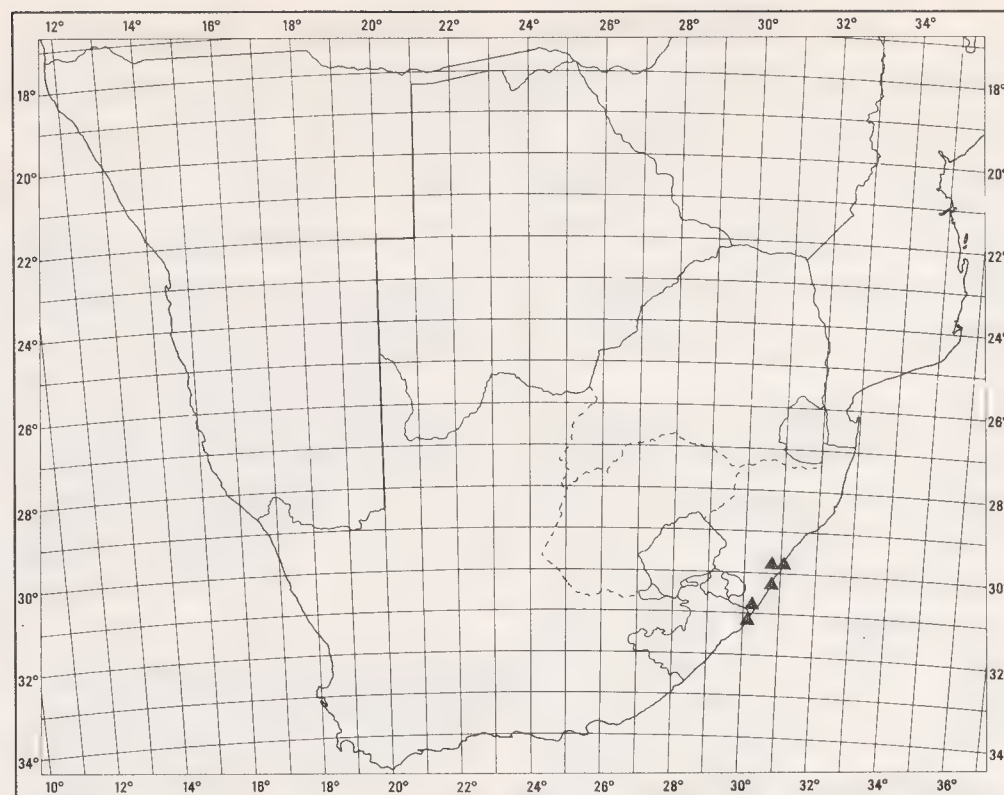
B. G. Jacobsen, Ferns Sthn Afr. 381, t. 285 (1983). Type: Mariana Islands, *Gaudichaud* s.n. (G, holo.; P).



*Polystichum torresianum* Gaud. in Freyc., Voy. Bot. 333 (1824). *Thelypteris torresiana* (Gaud.) Alston in Lilloa 30: 111 (1960).

Rhizome shortly creeping. *Fronde*s arching, herbaceous; *stipe* glaucous when fresh, stramineous when dry, set with castaneous, ciliate scales at extreme base; *lamina* deltate-acuminate, c.  $0,7 \times 0,5$  m, 4-pinnatifid, very narrowly winging secondary rhachises, set with translucent unicellular hairs scattered sparsely along veins above and below; *pinnules* lanceolate-deltate, wider and/or more deeply incised on acroscopic margin, pinnatifid almost to costule; *ultimate segments* lobed  $\frac{1}{3}$  to  $\frac{1}{2}$ -way to midvein, obtuse, margin entire to dentate; *rhachis* and *secondary rhachises* thickly set with translucent, somewhat matted hairs above, sublabrous below; *costae* and *costules* pilose with translucent unicellular hairs c. 0,5 mm long, sparsely pilose with translucent unicellular and multicellular hairs c. 1,5 mm long. *Sori* round; *indusium* very small, bearing a few capitate hairs. Fig. 73.

Indigenous in the warmer parts of mainland Asia and Japan, Malaysia, north-eastern Australia, Polynesia, Hawaii and the Mascarene Islands. *M. torresiana* escaped



MAP 192.—*Macrothelypteris torresiana*

from the Durban Botanic Garden in Natal where it was in cultivation in 1890 under the widely misapplied name *Nephrodium setigerum* Baker (fide R. E. Holttum), and has since spread into various fairly open, moist localities in Natal. Similarly, it can now be found at places in the New World, from the United States southwards to Venezuela (fide R. M. Tryon). Map 192.

Vouchers: Roux 635 (BOL); Schelpe 1139 (NU); Webb 135 (NU).

### 3. AMPELOPTERIS

*Ampelopteris* Kunze in Bot. Ztg 6: 114 (1848); Tardieu-Blot in Fl. Madag. 5, 1: 300 (1958); Alston in F.W.T.A. edn 2, Suppl. 63 (1959); Schelpe in F.Z. Pterid.: 200 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 82 (1973); in C.F.A. Pterid.: 160 (1977). Type species: *A. elegans* Kunze.

Rhizome creeping, set with non-peltate black rhizome-scales. Fronds tufted; *lamina* pinnate, freely proliferous along rhachis; *veins* from adjoining costules anastomosing. *Sori* circular to elongate, exindusiate, with capitate paraphyses.

A monotypic genus distributed through the tropics and subtropics of the Old World.

*Ampelopteris prolifera* (Retz.) Copel., Gen. Fil. 144 (1947); Schelpe in F.Z. Pterid.: 200, t. 56 (1970); Holttum in Jl S. Afr. Bot. 40: 153 (1974); Schelpe in C.F.A. Pterid.: 160, t. 28 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 398, t. 300 (1883) Type: India, Koenig s.n. (LD, holo.!, GOET).

*Hemionitis prolifera* Retz., Obs. Bot. 6: 38 (1791). *Meniscium proliferum* (Retz.) Swartz, Syn. Fil. 19, 207 (1806). *Goniopteris prolifera* (Retz.) Presl, Tent. Pterid. 183 (1836), reimpr. in Abh. K. Böhm. Ges. Wiss., ser. 4, 5: 183 (1837). *Nephrodium proliferum* (Retz.) Keys., Poly-pod. Cyath. Herb. Bunge 49 (1873). *Phegopteris prolifera*

(Retz.) Kuhn in Von Deck., Reisen, Bot. 3, 3: 44 (1879). *Polypodium proliferum* sensu Carr., Cat. Afr. Pl. Welw. 2: 275 (1901), non Kaulf. (1824), nec Roxb. (1828). *Dryopteris prolifera* (Retz.) C. Chr., Ind. Fil. 286 (1905); Sim, Ferns S. Afr. edn 2: 99, t. 14 (1915). *Cyclosorus proliferus* (Retz.) Tardieu-Blot ex Tardieu-Blot & C. Chr. in Notul. Syst. 14: 346 (1952). *Thelypteris prolifera* (Retz.) P. J. Vorster in Bothalia 12: 260 (1977).

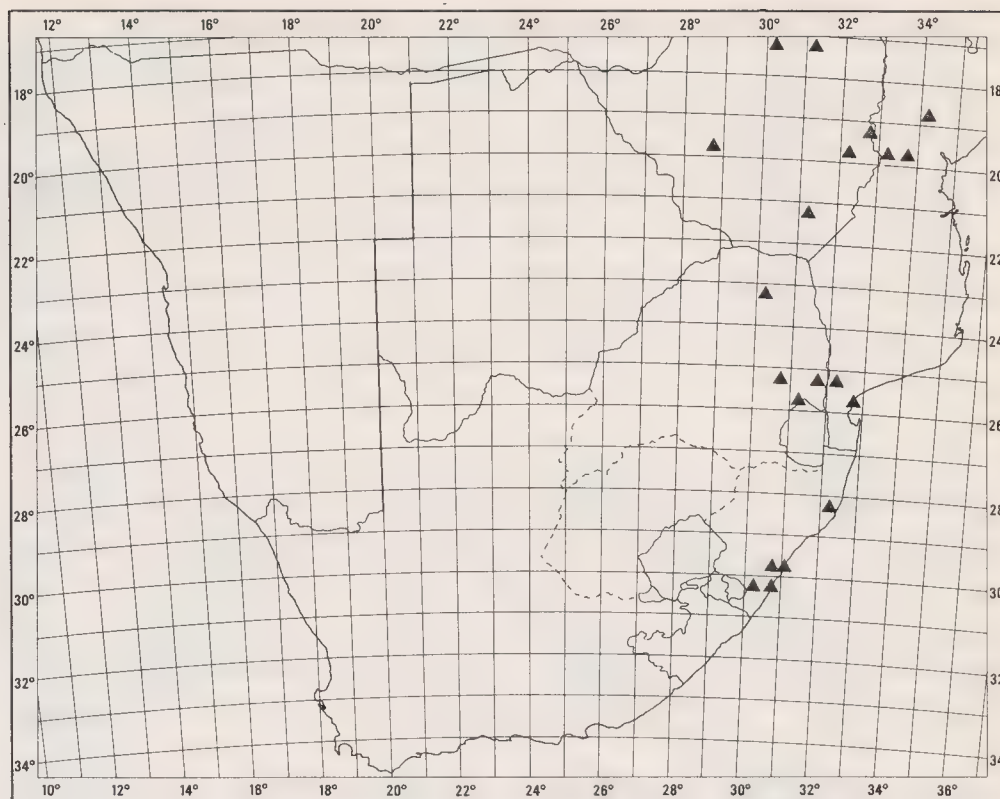
Rhizome up to 10 mm in diameter, set with entire, deltate-acuminate rhizome-scales up to 2 mm long. *Fronde*s closely spaced, arching, firmly membranous; *stipe* pale brown, nitid, up to 0,4 m long; *lamina* very narrowly deltate, up to  $1 \times 0,26$  m, attenuate, basal pin-



nae hardly reduced and upper pinnae progressively reduced towards apex; *lower pinnae* shortly petiolate to adnate, very narrowly oblong or attenuate with a truncate base, up to 150 × 20 mm, very shallowly incised into short truncate lobes, glabrous on both surfaces; *veins* up to 8 pairs per costule with at least 5 pairs anastomosing; *rhachis* pale brown, glabrous. *Sori* circular to elongate, exindusiate. Fig. 74.

Natal, Transvaal, Zimbabwe, Mozambique, Malawi, Zambia, Angola, Zaire, Tanzania, Madagascar, Mauritius, as well as the Palaeotropics. Also Guinea and Senegal (Alston, 1959). Sporadic along riverbanks in the more tropical parts of Southern Africa. Map 193.

Vouchers: *Rogers* 409 (GRA; PRE); *Schelpe* 4106 (BM; BOL); *Todd* 23 (NU).



MAP 193.—*Ampelopteris prolifera*

## ATHYRIACEAE

Terrestrial plants. Rhizome creeping, or more usually erect, forming a short caudex in some species, set with non-clathrate rhizome-scales. *Stipe* not articulated, with 2 vascular strands uniting upwards into a U-shaped strand, often papillate at the base at the sites of fallen scales. *Lamina* pinnate to 3-pinnate, costal grooves with uninterrupted raised edges; *veins* free or anastomosing. *Sori* superficial, round, elongate or J-shaped, with or without indusia. *Spores* monolete, with perispore.

1a *Sori* elongate or J-shaped:

2a *Sori* elongate or J-shaped, never back to back ..... 1. *Athyrium*

2b *Sori* elongate, at least some back to back:

3a Rhizome creeping; fronds 2-pinnatifid ..... 2. *Lunathyrium*

3b Rhizome erect; fronds 3-pinnatifid ..... 3. *Diplazium*

1b *Sori* round:

4a *Sori* with minute, reniform indusia not apparent in mature sori; frond 1–2 m long ..... 4. *Dryoathyrium*

4b *Sori* with obvious round dentate indusia; frond less than 0.5 m long ..... 5. *Cystopteris*

A recent review of Japanese species of *Athyrium* and allied genera by Kato (1977) emphasises the need for a re-evaluation of generic concepts in the Athyriaceae on a world-wide basis.

## 1. ATHYRIUM

***Athyrium*** Roth, Tent. Fl. Germ. 3: 31, 58 (1799); Engl., Pflanzenw. Afr. 2: 23 (1908); Tardieu-Blot in Mém. Inst. fr. Afr. noire 28: 160 (1953); in Fl. Madag. 5, 1: 259 (1958); Alston in F.W.T.A. edn 2, Suppl. 64 (1959); Tardieu-Blot in Fl. Camer. 3: 228 (1964); Schelpe in F.Z. Pterid.: 202 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 84 (1973); in C.F.A. Pterid.: 162 (1977). Type species: *A. filix-femina* (L.) Roth (= *Polypodium filix-femina* L.).

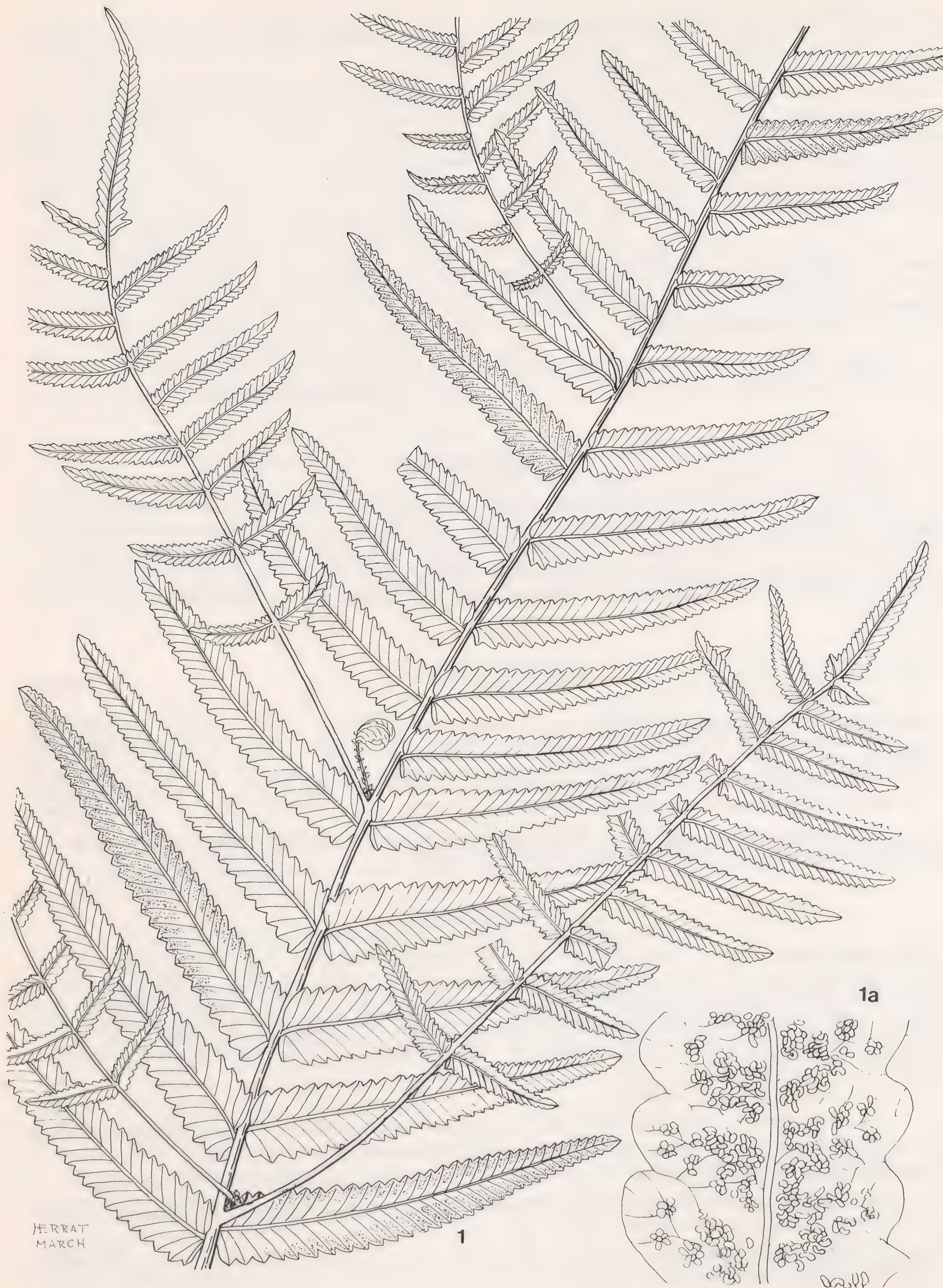
Rhizome erect or creeping, set with non-peltate rhizome-scales. Fronds tufted or closely spaced; *stipe* pink or pale green when fresh; *lamina* herbaceous, 2- to 4-pinnatifid, rarely simple or pinnatifid, mostly glabrous; *veins* free. *Sori* superficial, mostly J-shaped, indusiate.

A cosmopolitan genus of about 180 species, mostly distributed through the north temperate regions and with 2 species in continental Africa.

Rhizome creeping; basal pinnae reduced ..... 1. *A. schimperi*

Rhizome erect; basal pinnae hardly or not reduced ..... 2. *A. scandicinum*







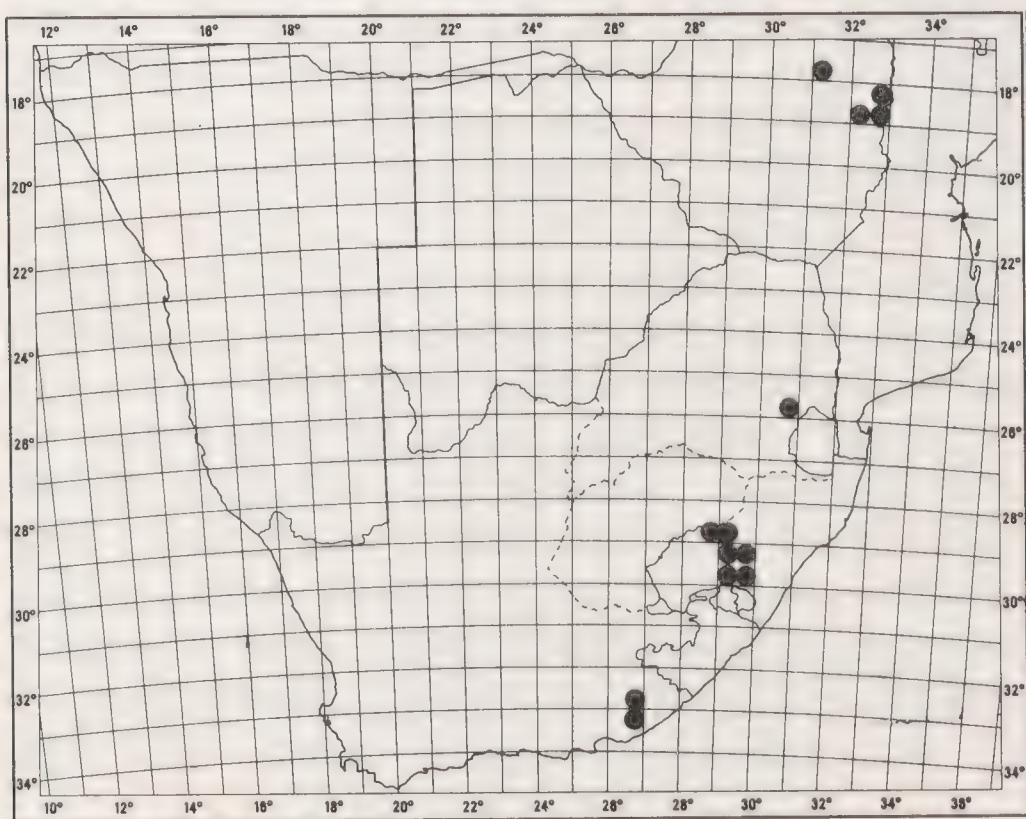
1. *Athyrium schimperi* Moug. ex Fée, Mém. Fam. Foug. 5: 187 (1852); Sim, Ferns S. Afr. edn 2: 133, t. 41 (1915); Schelpe in F.Z. Pterid.: 202, t. 57B (1970); in C.F.A. Pterid.: 162 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 404, t. 303 (1983). Type: Ethiopia, Debra Eski, *Schimper* 239 (B, holo.).

*Asplenium schimperi* (Moug. ex Fée) A. Br. in Schweinf., Beitr. Fl. Aethiop. 1: 224 (1867).

Rhizome creeping, up to 6 mm in diameter, set with reddish brown, lanceolate-acuminate rhizome-scales up to 7 mm long. *Fronds* closely spaced, erect, herbaceous; *stipe* pale brown when dry, dark brown and set with scales basally, otherwise glabrous, up to 0,38 m long; *lamina* oblong-lanceolate, acute to acuminate, up to  $0,7 \times 0,28$  m, deeply 3-pinnatifid, basal pair of pinnae usually somewhat reduced; *pinnae* very narrowly ovate, attenuate, up to  $160 \times 50$  mm; *pinnules* usually equally developed acroscopically and basiscopically; *pinnule lobes* narrowly oblong and very sharply serrate-dentate, glabrous on both surfaces; *rhachis* pale brown, glabrous, with narrow wings above and minutely pubescent at junction of pinnae. *Sori* oblong, curved to J-shaped, 1–1,5 mm long; *indusia* pale brown, erose to lacerate, membranous. Fig. 75.

Eastern Cape Province, Natal, Lesotho, Transvaal, Zimbabwe, Malawi, Zambia, Angola, Zaire, Burundi, Tanzania, Uganda, Ethiopia, Sudan, Cameroun, Nigeria and Ghana. Around exposed boulders in moist situations or rarely in light shade in forest, 1 500–2 300 m. Map 194.

Vouchers: *Acocks* 11381 (NH; PRE); *Burrows* 1350 (BOL; NBG); *Schelpe* 1249 (BM; NU).



MAP 194.—*Athyrium schimperi*

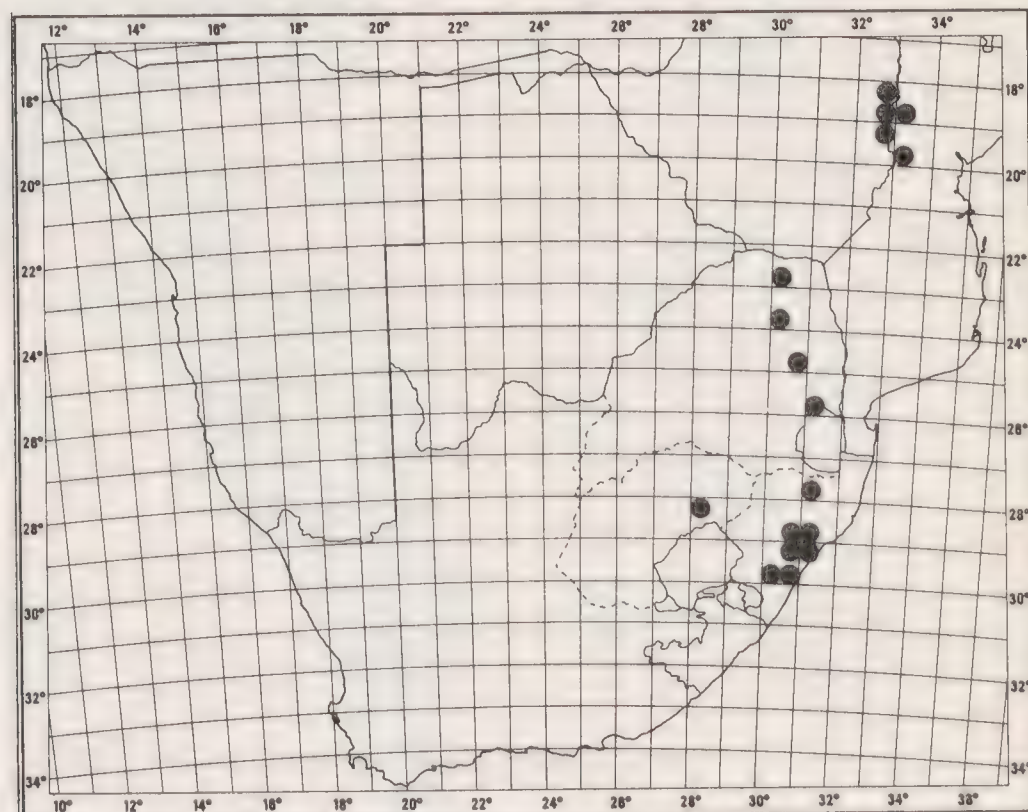
2. *Athyrium scandicinum* (Willd.) Presl, Tent, Pterid.: 98 (1836), reimpr. in Abh. K. Böhm. Ges. Wiss., ser. 4, 5: 98 (1837); Sim, Ferns S. Afr. edn 2: 133, t. 42 (1915); Schelpe in F.Z. Pterid.: 204 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 404, t. 304 (1983). Type: Réunion, *Bory* s.n., Herb. Willdenow no. 19832 (B, holo.).

*Aspidium scandicinum* Willd. in L., Sp. Pl. edn 4,5: 285 (1810). *Allantodia scandicina* (Willd.) Kaulf., Enum. Fil. 179 (1834). *Cystopteris scandicina* (Willd.) Desv. in Mém. Soc. Linn., Paris 6, 2: 264 (1828). *Nephrodium scandicinum* (Willd.) Bory in Bélanger, Voy., Ind. Or. Bot. 2: 63 (1833). *Asplenium scandicinum* (Willd.) Heller, Minn. Bot. Stud. 1: 775 (1897), non Kaulf. (1824).

*Asplenium aspidioides* Schlechtd., Adumbr. 24, t. 13 (1825), nom. illeg. *Allantodea aspidioides* (Schlechtd.) Kunze in Bot. Ztg 1848: 191 (1848). *Athyrium aspidioides* (Schlechtd.) Christ, Farnkr. 224 (1897). Syntypes: Cape of Good Hope, *Bergius* s.n.; Réunion, *Bory* s.n.

*Athyrium laxum* Pappe & Raws., Syn. Fil. Afr. Austr. 16 (1858), non Schum. (1803). *Asplenium laxum* (Pappe & Raws.) Kuhn, Fil. Afr. 105 (1868), non R. Br. (1810). Type: Natal, *Gueinzius* s.n. (Type not seen).

Rhizome erect, up to 5 mm in diameter, set with brown, lanceolate-oblong, entire rhizome-scales up to 7 mm long. *Fronds* tufted, arching, softly herbaceous; *stipe* pale brown when dry, nitid, set with scattered scales, up to 0,55 m long; *lamina* narrowly ovate, acute to acuminate-caudate apically, up to  $0,51 \times 0,34$  m, 3-pinnatifid to 3-pinnate, basal pair of pinnae slightly reduced; *pinnae* lanceolate, shortly acuminate to acuminate-caudate, up to  $200 \times 60$  mm; *pinnules* developed somewhat more basiscopically than acroscopically; *pinnule lobes* ob-



MAP 195.—*Athyrium scandicinum*





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long, shallowly crenate to strongly crenate-dentate, glabrous on both surfaces; *rhachis* pale brown, glabrous, with narrow green wings above, minutely pubescent at junction of pinnae above. *Sori* oblong, slightly curved to J-shaped, up to 2 mm long; *indusia* brown, erose to subentire, glabrous. Fig. 76: 1.

Natal, Swaziland, Transvaal, Zimbabwe, Mozambique, Malawi, Tanzania, Kenya, Uganda, Sudan, Madagascar, Réunion. Confined to moist heavily shaded situations in forest, at altitudes between 1 300 and 1 900 m in Natal, and between 1 000 and 2 000 m in eastern Zimbabwe and southern Mozambique. Map 195.

Vouchers: *Burrows* 1382 (BOL; NBG); *Schelpé* 6054 (BM; BOL); 6214 (BM; BOL); 6266 (BM; BOL).

## 2. LUNATHYRIUM

**Lunathyrium** Koidzumi in Acta Phytotax. Geobot. 1: 30 (1932). Type species: *L. pycnosorum* (Christ) Koidzumi (= *Athyrium pycnosorum* Christ; *L. acrostichoides* (Swartz) Ching).

Rhizome creeping, scaly. *Fronds* closely or widely spaced; *stipe* base swollen or not; *lamina* not pentagonal in outline, pinnatifid to 2-pinnatifid, decrescent or not. *Sori* curved, narrowly oblong, straight or occasionally J-shaped, with lateral indusium.

A predominantly Asiatic genus consisting of about 30 species allied to *Athyrium* and not always accepted as distinct.

**Lunathyrium japonicum** (Thunb.) Kurata in J. Geobot. 9: 99 (1961); W. B. G. Jacobsen, Ferns Sthn Afr. 406, t. 305 (1983). Type: Unknown.

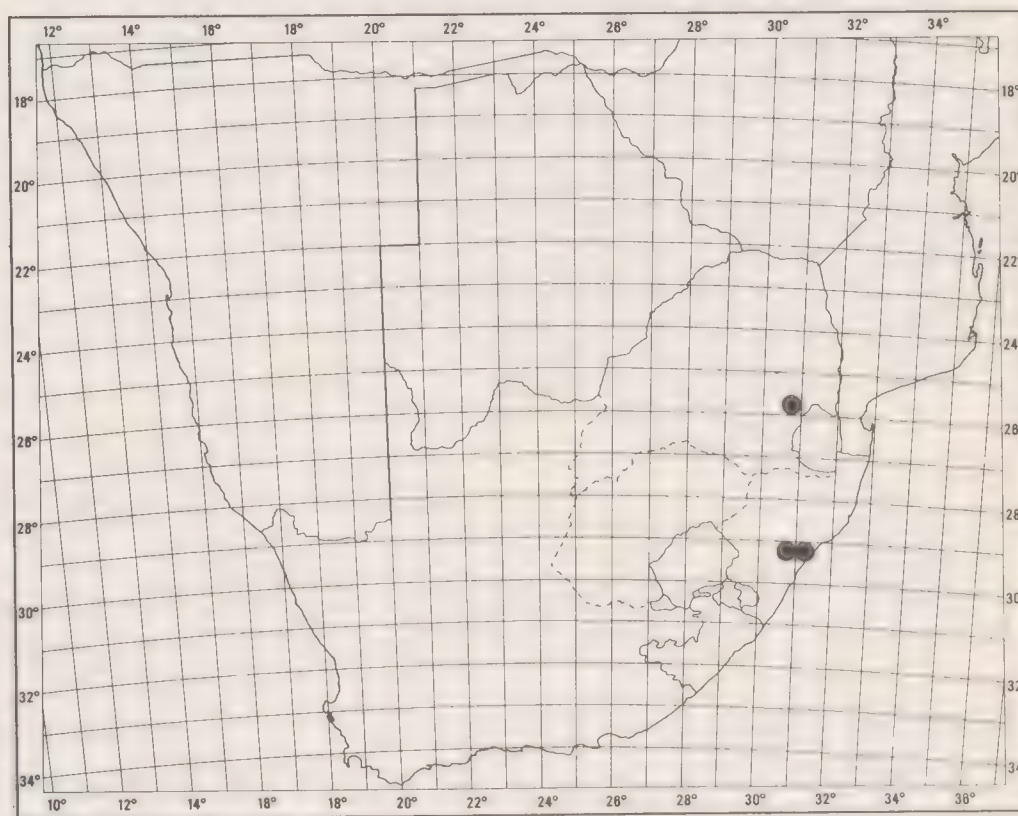
*Asplenium japonicum* Thunb., Fl. Jap. 334 (1784). *Diplazium japonicum* (Thunb.) Bedd., Ferns Brit. Ind., Suppl. 12 (1876). *Athyrium japonicum* (Thunb.) Copeland in Philipp. J. Sci., Bot. 3: 290 (1908). *Athyriopsis japonicum* (Thunb.) Ching in Acta Phytotax. Sinica 9: 63 (1964). *Deparia japonica* (Thunb.) M. Kato in Bot. Mag. Tokyo 90: 36 (1977).

back, up to 3,5 mm long and 0,3 mm broad; *indusium* pale brown, membranous, erose-lacerate.

Natal—apparently escaped from cultivation. Originally Ceylon, India, China, Japan, Malasia, New Zealand, Queensland, Pacific islands to Fiji, Samoa, Cook Islands and New Caledonia. Introduced to Azores. In Southern Africa terrestrial in forest along streambanks in light to deep shade, c. 200 m. Map 196.

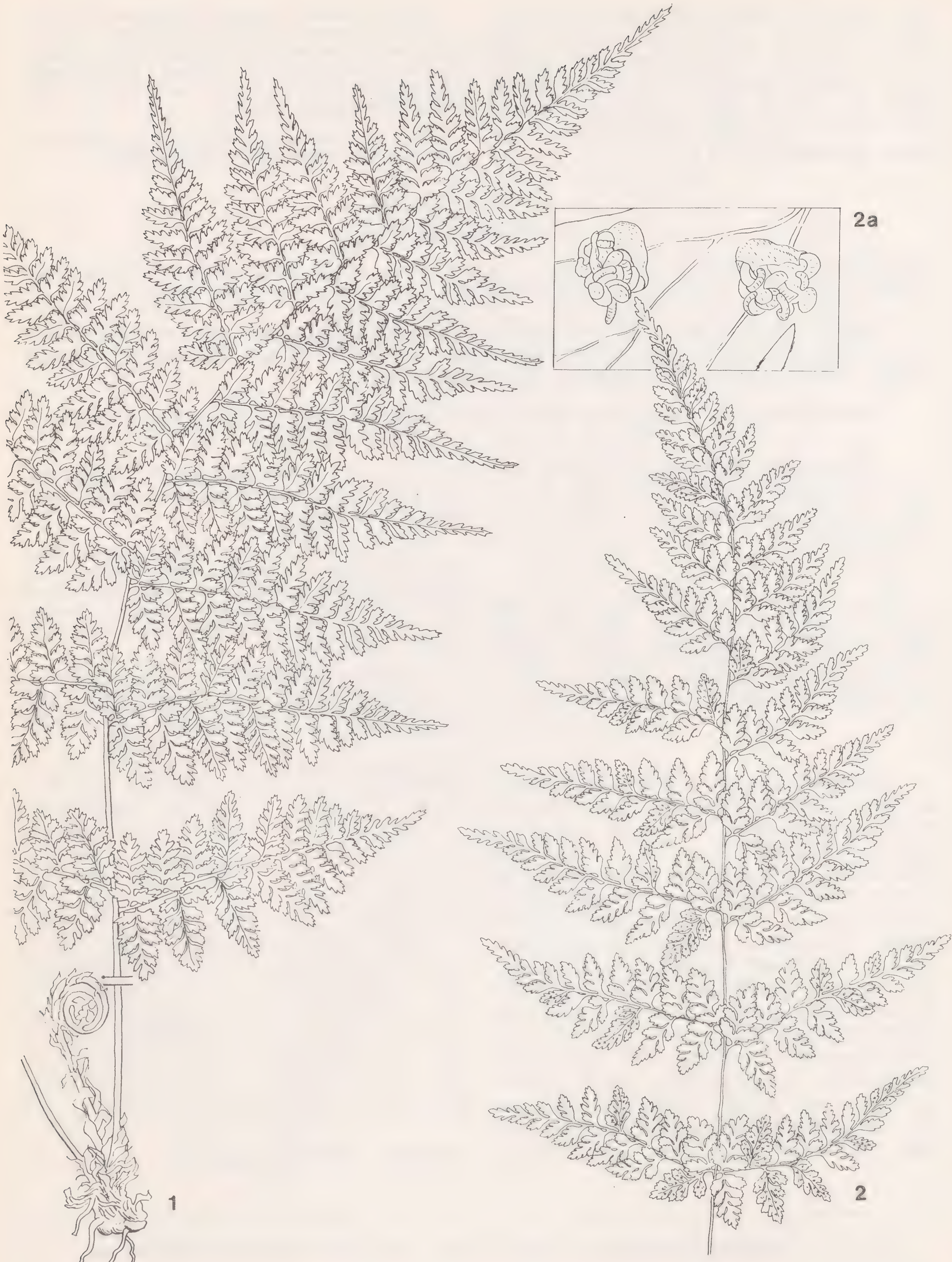
Vouchers: *Van Jaarsveld & Jacobs* 5848 (B; BOL; C; G; K; MO; NBG; P; PRE; S); 5853 (B; BOL; NBG; P; PRE; S); 5874 (BOL MO; NBG; PRE); 5907 (BOL; K; NBG; PRE); *Van Jaarsveld & Lang* 5103 (BOL; NBG).

Rhizome creeping, c. 5 mm in diameter, set with lanceolate, clathrate, brown rhizome-scales. *Fronds* spaced 5–10 (–20) mm apart, arching, herbaceous, up to c. 0,75 m tall; *stipe* light brown, becoming dark brown basally, as long as or longer than *lamina*, set with clathrate brown scales c. 2–5 mm long; *lamina* ovate-deltate, 2-pinnatifid, basal pinnae not conspicuously reduced and basiscopically developed, set with minute multicellular hairs along veins on both surfaces; *pinnae* lanceolate, attenuate, deeply pinnatifid into rhombic, somewhat falcate lobes c. 8 × 6 mm, each lobe serrate-dentate laterally, dentate apically; *rhachis* sulcate, pubescent with minute multicellular hairs and set with scattered scales; *costae* sulcate, pubescent. *Sori* borne along veins, some back to



MAP 196.—*Lunathyrium japonicum*







## 3. DIPLAZIUM

**Diplazium** Swartz in J. Bot., Gött. 1800, 2: 4, 61 (1801); Engl., Pflanzenw. Afr. 2: 23 (1908); Alston in F.W.T.A. edn 2, Suppl. 64 (1959); Tardieu-Blot in Fl. Gabon 8: 144 (1964); in Fl. Camer. 3: 233 (1964); Schelpe in F.Z. Pterid.: 204 (1970); in C.F.A. Pterid.: 163 (1977). Lecto-type species: *D. plantagineum* (L.) Swartz (= *Asplenium plantagineum* L.).

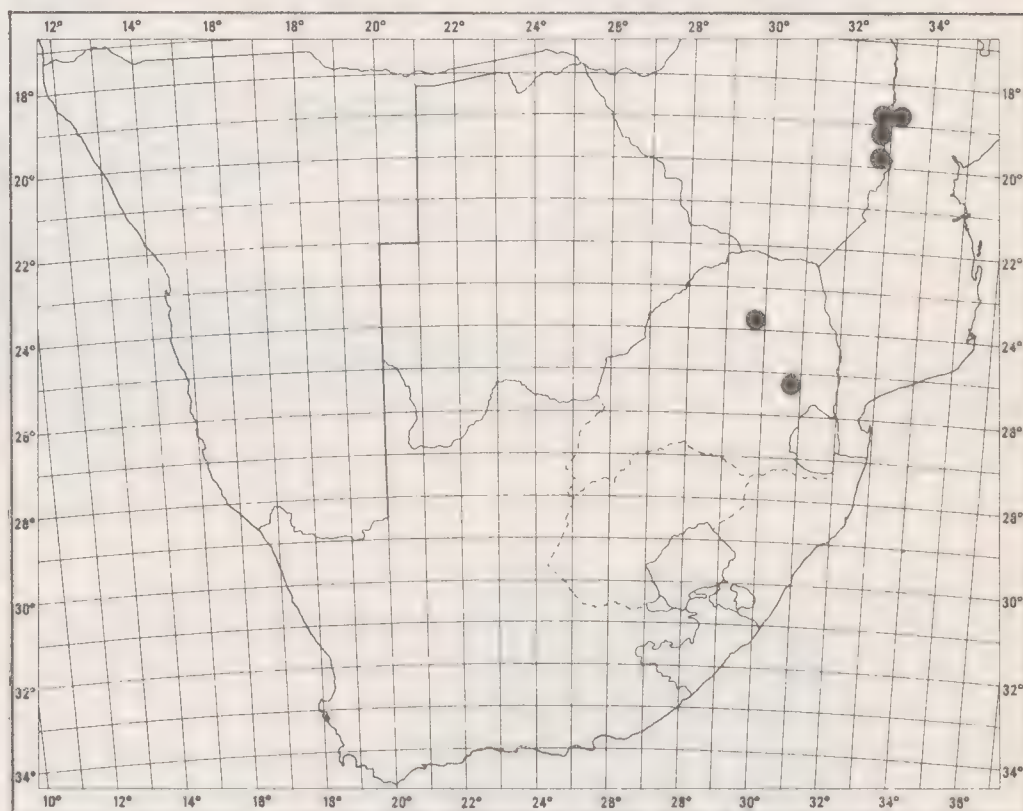
Rhizomes mostly erect, often forming a short caudex, set with non-peltate rhizome-scales and frequently bearing strong black roots. *Lamina* usually large, 3- to 4-pinnate, mostly glabrous, firmly herbaceous to coriaceous; *veins* free. *Sori* superficial, elongate; *indusia*, at least those near the costule, in pairs set back to back.

A pantropic genus with 5 species in continental Africa.

**Diplazium zanzibaricum** (Bak.) C. Chr., Ind. Fil. 241 (1905); Schelpe in F.Z. Pterid.: 205, t. 58B (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 410, t. 307 (1983). Type: ?Tanzania, *Last* s.n. (K, holo.!).

*Asplenium zanzibaricum* Bak. in Ann. Bot. 5: 311 (1891).

Rhizome erect, up to 0,4 m tall and 0,15 m in diameter, set with lanceolate, acuminate, somewhat fimbriate rhizome-scales. *Fronds* arching; *stipe* pale brown when dry, up to 1 m long and 10 mm in diameter, mostly subglabrous but set with numerous attenuate, shortly ciliate, brown scales up to 11 mm long among a very short, dense tomentum basally; *lamina* broadly ovate, acute, up to 1,5 × 1,4 m, very deeply 3-pinnatifid, basal pinnae and pinnules slightly reduced, up to 0,68 × 0,25 m; *pinnules* cut almost to costules into narrow, oblong, pinnatifid, obtuse lobes, glabrous on both surfaces except for minute whitish hairs on costules; *rhachis* pale brown, sulcate, glabrous; *secondary rhachises* pale brown with narrow wings above. *Sori* narrowly oblong, 1–1,5 mm long; *indusium* brown, membranous, erose. Fig. 77: 2.



MAP 197.—*Diplazium zanzibaricum*

Transvaal, Zimbabwe, Mozambique, Zambia, Zaire, Tanzania, Uganda, Cameroun, Guinea, Madagascar and Comoro Islands. A large terrestrial fern which is locally frequent in deeply shaded, wet situations in the montane forests of north-eastern Transvaal, eastern Zimbabwe and Mozambique at 1 200–2 300 m altitude. Map 197.

Vouchers: Ayres s.n. (K); Enslin & Schweickhardt s.n. (BM; PRU).

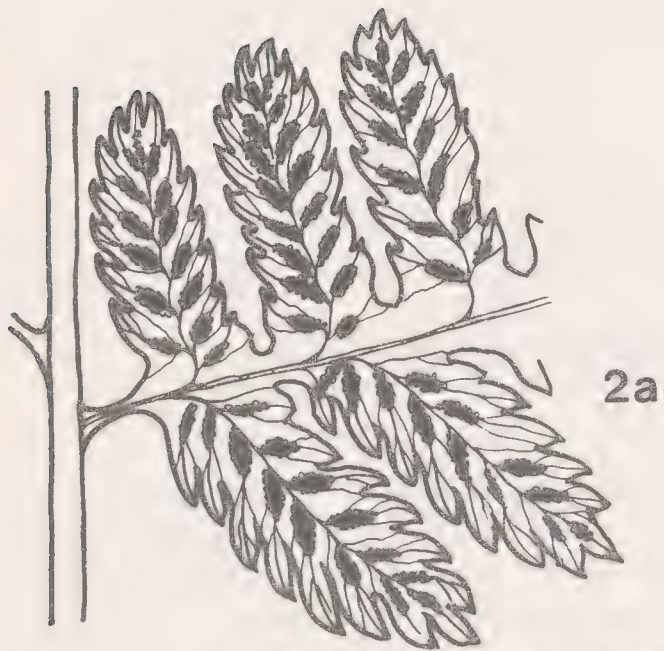
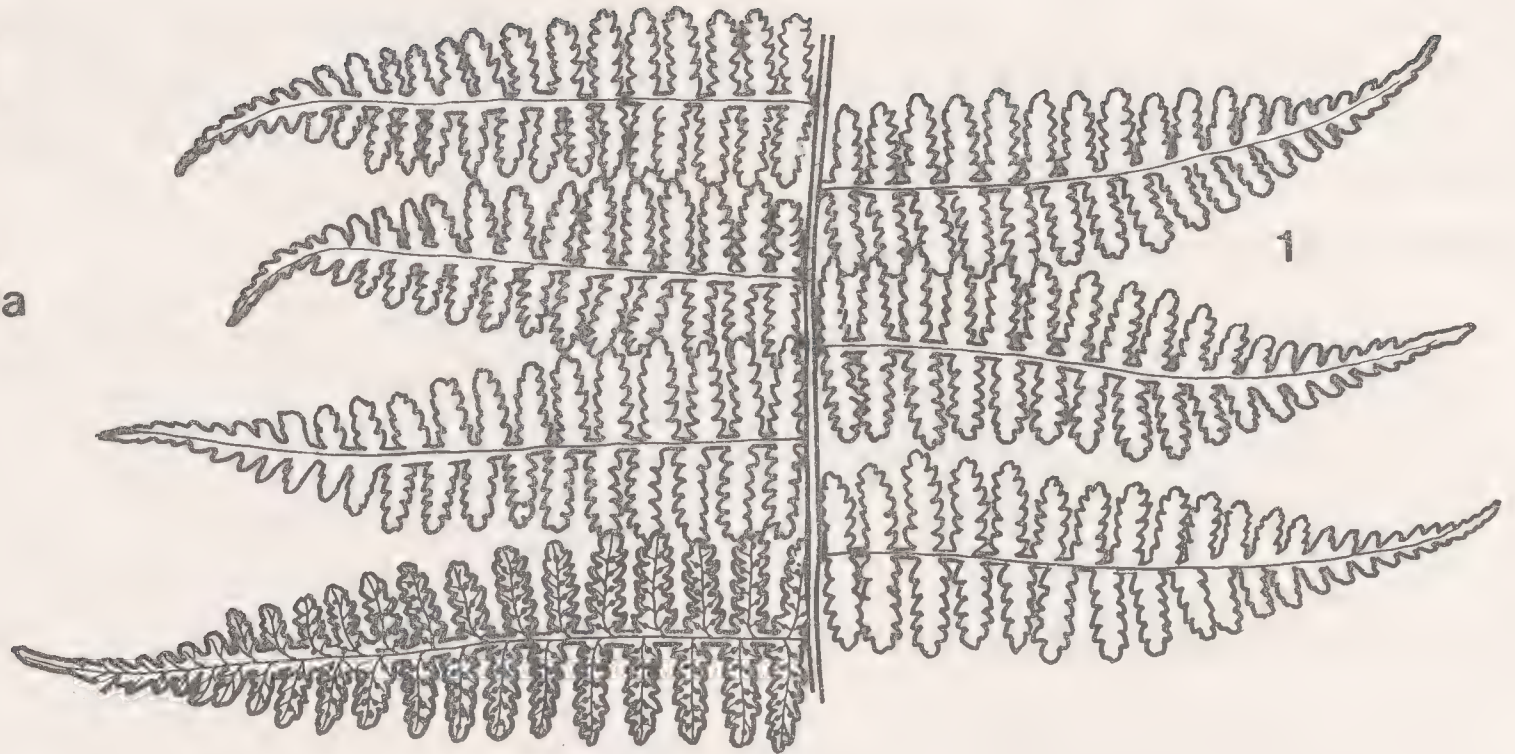
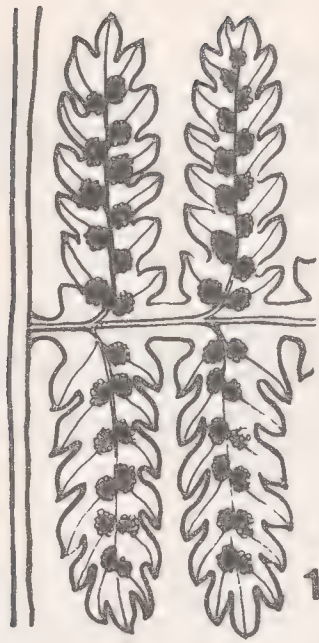
## 4. DRYOATHYRIUM

**Dryoathyrium** Ching in Bull. Fan Memor. Inst. Biol., Bot. 11: 79 (1941); Schelpe in F.Z. Pterid.: 207 (1970). Type species: *D. boryanum* (Willd.) Ching (= *Aspidium boryanum* Willd.).

Rhizome erect, forming a short caudex, set with non-peltate rhizome-scales. *Lamina* large, 4-pinnatifid, glabrous except for minute short hairs along the narrowly and evenly winged costules, herbaceous; *veins* free. *Sori* with minute reniform indusia not apparent in mature sori.

A tropical genus of about 10 species distributed from tropical Africa and Madagascar to China and Japan. Only one species occurs in continental Africa.





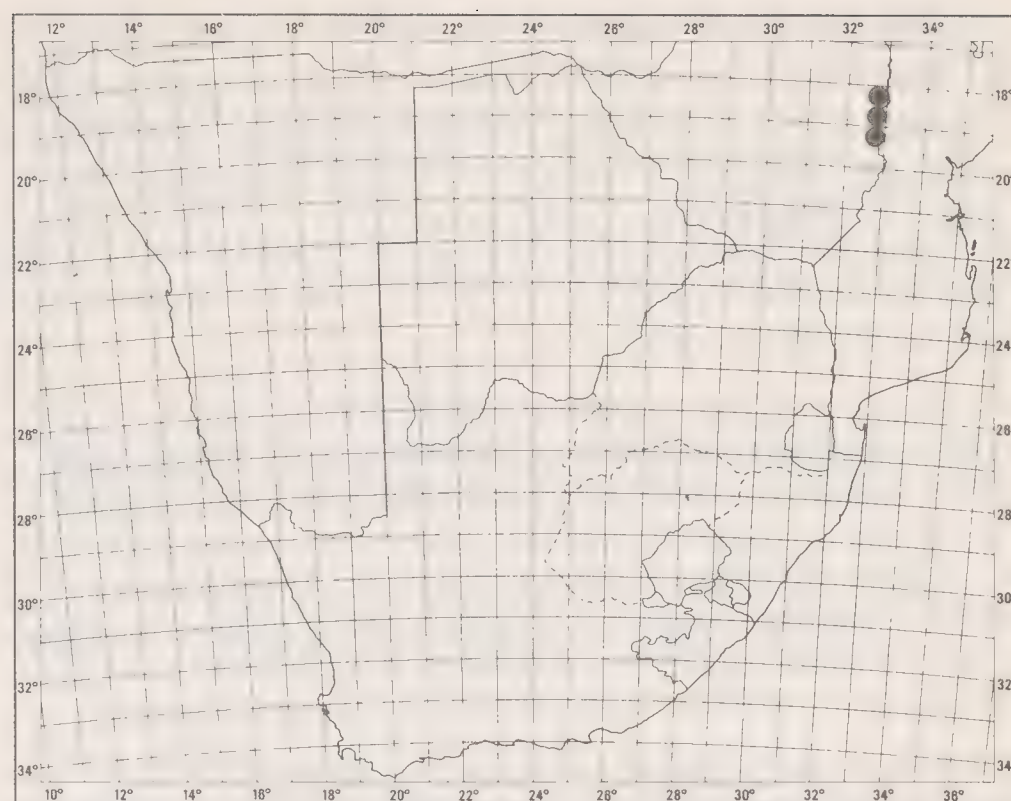
*W.M. Holgate.*



**Dryoathyrium boryanum** (Willd.) Ching in Bull. Fan Memor. Inst. Biol., Bot. 11: 79 (1941); Schelpe in F.Z. Pterid.: 207, t. 59 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 411, t. 308 (1983). Type: Réunion, *Bory* s.n., Herb. Willdenow no. 19831 (B, holo.!).

*Aspidium boryanum* Willd. in L., Sp. Pl. edn 4, 5: 285 (1810). *Lastrea boryana* (Willd.) T. Moore, Ind. Fil. 86 (1858). *Nephrodium boryanum* (Willd.) Bak., Syn. Fil. 284 (1867). *Dryopteris boryana* (Willd.) C. Chr., Ind. Fil. 255 (1906). *Athyrium boryanum* (Willd.) Tagawa in Acta Phytotax. Geobot. 4: 144 (1935). *Ctenitis boryana* (Willd.) Copel., Gen. Fil. 123 (1947). *Cornopteris boryana* (Willd.) Tardieu-Blot in Am. Fern J. 48: 32 (1958). *Parathyrium boryanum* (Willd.) Holttum in Kew Bull. 13: 449 (1959). *Deparia boryana* (Willd.) M. Kato in Bot. Mag. Tokyo 90: 36 (1977).

Rhizome set with pale brown, concolorous, subentire, ovate to lanceolate rhizome-scales up to 5 mm long. *Fronds* tufted, arching; *stipe* matt greyish brown, up to 1 m long, glabrous except for pale brown scales basally; *lamina* narrowly ovate, acute, up to 1 × 0,64 m, basal pinnae hardly reduced; *pinnae* shortly petiolate, oblong-lanceolate, attenuate, up to 340 × 150 mm, deeply 3-pinnatifid, developed equally acroscopically and basiscopically, basal pinnules somewhat reduced; *pinnules* oblong-acuminate, base truncate, deeply pinnatifid into narrowly oblong, obtuse, deeply crenate-serrate lobes with an angular sinus between them, gla-



MAP 198.—*Dryoathyrium boryanum*

brous except for minute hairs along costules and veins; *rhachises* pale brown. *Sori* up to 10 per pinnule lobe, c. 0,6 mm in diameter; *indusium* subentire. Fig. 77: 1.

Transvaal, Zimbabwe, Mozambique, Tanzania, Kenya, Uganda, Cameroun, Nigeria, Fernando Po, Madagascar, Réunion, Comoro Islands. Also Sri Lanka, NE Himalayas, SW China, Malay Peninsula, Sumatra, Java, Bali, Borneo, Luzon (Holttum, 1958). A rare fern occurring in wet deeply shaded localities at altitudes from 1 300 to 1 750 m. Map 198.

Voucher: Schweickhardt 4511 (PRE).

## 5. CYSTOPTERIS

**Cystopteris** Bernh. in Neues J. Bot. 1, 2: 26 (1805); Tardieu-Blot in Fl. Madag. 5, 1: 249 (1958); Alston in F.W.T.A. edn 2, Suppl. 64 (1959); Tardieu-Blot in Fl. Camer. 3: 227 (1964). Type species: *C. fragilis* (L.) Bernh. (= *Polypodium fragile* L.).

Rhizome shortly creeping, dictyostelic, set with lanceolate brown rhizome-scales. *Stipe* stramineous to castaneous. *Lamina* herbaceous, 2- to 4-pinnatifid, glabrous; *veins* free. *Sori* dorsal on veins, round, without paraphyses; *indusia* peltate. *Spores* reniform, smooth or muricate.

A genus of about 18 temperate and subtropical species.

**Cystopteris fragilis** (L.) Bernh. in Neues J. Bot. 1, 2: 27, t. 2 fig. 9 (1806); Sim, Ferns S. Afr. edn 2: 88, t. 8 (1915); W. B. G. Jacobsen, Ferns Sthn Afr. 402, t. 302 (1983). Type: Europe, Herb. Sloane (H.S. 96, fol. 40) (BM, holo.!).

*Polypodium fragile* L., Sp. Pl. 2: 1091 (1753). *Cyathea fragilis* (L.) J.E. Sm. in Mem. Acad. Turin 5: 417 (1793). *Aspidium fragile* (L.) Swartz in J. Bot., Gött. 1800, 2: 4 (1801). *Athyrium fragile* (L.) Spreng., Anleit. Ken. Gew.

3: 136 (1804). *Cyclopteris fragilis* (L.) Gray, Nat. arr. Britt. Pl. 2: 9 (1821). *Cystea fragilis* (L.) J.E. Sm., English Flora 4: 289 (1828). *Filix fragilis* (L.) Underw., Our nat. Ferns edn 6: 119 (1900).

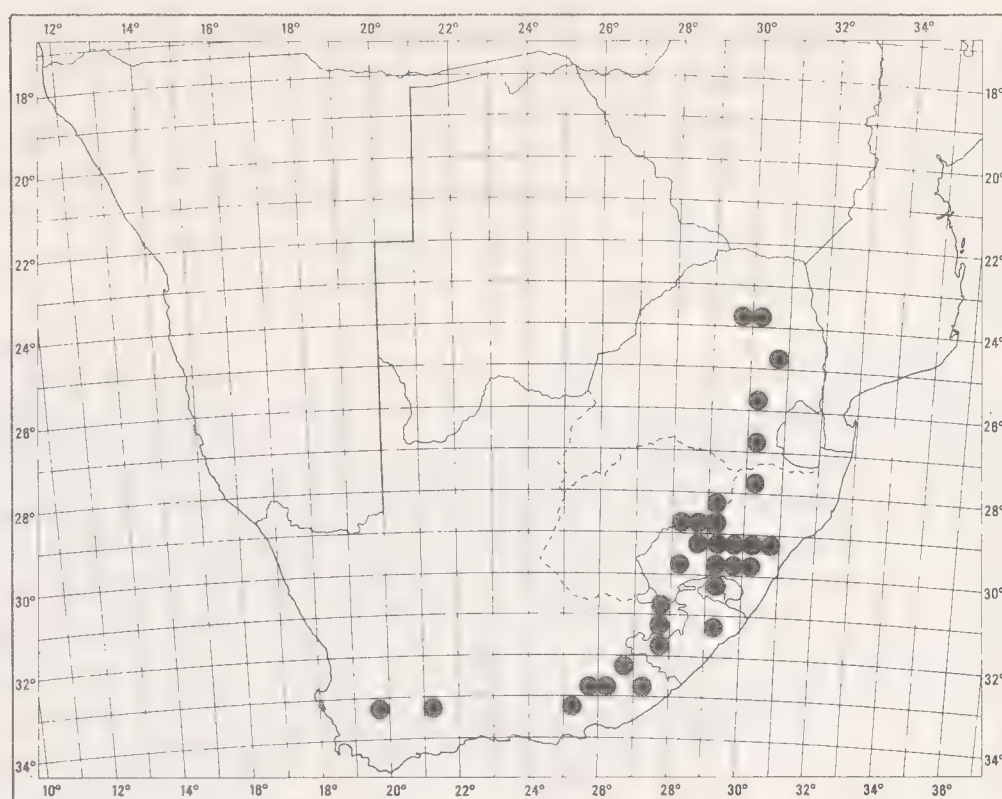
Rhizome c. 2 mm in diameter, set with pale to reddish brown, subentire, lanceolate, thin rhizome-scales up to 3 × 0,6 mm. *Fronds* closely spaced, thinly herbaceous; *stipe* stramineous, sparsely scaly, becoming brown and set with broader scales basally, up to 90 mm long;



*lamina* ovate to oblong-lanceolate, up to 150 × 50 mm, basal pinnae reduced, 3- to 4-pinnatifid (2-pinnatifid in young plants), lamina narrowly winging costules; *ultimate lobes* obtusely dentate (occasionally acute). *Sori* c. 0,5 mm in diameter, opening towards margin; *indusia* dentate to lacerate. Fig. 76: 2.

Eastern Cape Province, Transkei, Lesotho, Natal, Transvaal, Zaire, Kenya, Uganda, Tanzania, Ethiopia, Sudan, Cameroun, Morocco, Cape Verde Islands, Fernando Po, Réunion, Comoro Islands; panboreal from Mexico to Sri Lanka. In moist shaded habitats predominantly in the summer-rainfall area, from altitudes of about 1 300 m to the summit plateau of the Natal Drakensberg at 3 500 m, where the fronds dry off and wither during the winter. Map 199.

Vouchers: *Esterhuysen* 26700 (B; BOL; C; GH; K; M; MO; P; PR; PRE; S); *Galpin* 6936 (BOL; GRA); *Hilliard & Burt* 11794 (NU); *Pott* 4861 (BOL; PRE).



MAP 199.—*Cystopteris fragilis*

## LOMARIOPSIDACEAE

Epiphytic, lithophytic or terrestrial plants. *Rhizome* creeping or scandent, dorsiventral, set with non-peltate rhizome-scales. *Stipe* articulated or not. *Lamina* simple, or pinnate, basiscopic pinna margin decurrent on rhachis; *veins* free or anastomosing, without included veinlets; *fertile fronds* acrostichoid. *Spores* monolete, with perispore.

Veins free ..... 1. *Elaphoglossum*  
Veins anastomosing ..... 2. *Bolbitis*

### 1. ELAPHOGLOSSUM

*Elaphoglossum* Schott ex. J. Sm., in J. Bot., Gött. 4: 148 (1841); Engl., Pflanzenw. Afr. 2: 58 (1908); Tardieu-Blot in Mém. Inst. fr. Afr. noire 28: 103 (1953); Alston in F.W.T.A. edn 2, Suppl. 65 (1959); Tardieu-Blot in Fl. Madag. 5, 2: 21 (1960); in Fl. Camer. 3: 296 (1964); Pichi-Sermolli in Webbia 23: 217 (1968); Schelpe in F.Z. Pterid.: 209 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 84 (1973); in C.F.A. Pterid.: 164 (1977); J. P. Roux in Jl S.Afr. Bot. 48: 481 (1982). Type species: *E. conforme* (Swartz) J. Sm. (= *Acrostichum conforme* Swartz).

Rhizome creeping, set with brown or black rhizome-scales. *Fronds* tufted or spaced, strongly to weakly dimorphous; *fertile fronds* acrostichoid; *stipes* articulated basally; *lamina* simple, thinly or densely set with entire or fimbriate or stellate scales; *veins* parallel and free.

A genus of over 450 species with the greatest concentration in tropical South America.

1a Sterile lamina set with scales longer than 1,5 mm (i.e. visible to the naked eye):

2a Scales longer than 1,5 mm restricted to midrib and margin of lamina, dark brown; lamina surface set with scattered stellate or substellate scales:

3a Sterile lamina linear, acuminate, base rounded cuneate; lanceolate scales with fimbriate bases present 1. *E. aubertii*

3b Sterile lamina narrowly oblong to very narrowly elliptic, acute, base shortly decurrent; only stellate scales present ..... 2. *E. hybridum*

2b Scales longer than 1,5 mm covering both surfaces of lamina, light brown; stellate scales absent:

4a Fronds clustered; apex of sterile lamina obtuse; lamina scales subentire ..... 3. *E. spathulatum*

4b Fronds spaced c. 5 mm apart; apex of sterile lamina acute; lamina scales with prominent filamentous outgrowths ..... 4. *E. drakensbergense*

1b Sterile lamina set with scales less than 1,5 mm long only:

5a Sterile lamina broadly elliptic to elliptic-oblong, thickly coriaceous:

6a Fronds closely spaced, young fronds not viscid; apex of sterile lamina acute, lamina scales stellate ..... 5. *E. macropodium*



- 6b Fronds spaced 3–18 mm apart, young fronds glandular viscid; apex of sterile lamina rounded, lamina scales round..... 6. *E. conforme*
- 5b Sterile lamina oblanceolate to narrowly elliptic-acuminate, thinly coriaceous:
- 7a Sterile lamina very narrowly elliptic-acuminate, apex acuminate; midrib conspicuously sulcate above when fresh; often lithophytic ..... 7. *E. acrostichoides*
- 7b Sterile lamina oblanceolate, apex obtuse-acute; midrib convex above when fresh; often in deep forest shade on old tree stumps ..... 8. *E. angustatum*

1. ***Elaphoglossum aubertii* (Desv.) T. Moore**, Ind. Fil. 5 (1857); Sim, Ferns S. Afr. edn 2: 289, t. 152 (1915); Schelpe in Contr. Bolus Herb. 1: 32 (1969); in F.Z. Pterid.: 213 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 421, t. 315 (1983). Type: Réunion, Thouars s.n. (P, holo.).

*Acrostichum aubertii* Desv. in Mag. Ges. Naturf. Berl. 5: 309 (1811).

Rhizome short, c. 3–8 mm in diameter, set with brown, lanceolate-acuminate, entire, hair-pointed rhizome-scales up to  $65 \times 7$  mm. Fronds clustered, arching, firmly membranous; stipe stramineous to pale brown, set with persistent squarrose scales, stipes of fertile fronds much longer than those of sterile fronds, up to 180 mm and 70 mm long respectively; sterile lamina linear, acuminate, up to  $290 \times 17$  mm, set with brown involute scales along midrib and smaller fimbriate scales on both surfaces and margins, base rounded cuneate not decurrent, margin entire or irregularly and shallowly undulate; fertile lamina very narrowly oblong, acute, up to  $100 \times 13$  mm, base broadly cuneate to cordate-truncate.

Natal through Transvaal to Zimbabwe, Mozambique, Malawi, Kenya, Tanzania, Uganda, Cameroun, Fernando Po, São Tomé, Madagascar, Comoro Islands, Mauritius and Réunion. *E. aubertii* grows on moss covered bould-

ers or as a low-level epiphyte in moist forest. In Natal it occurs below 1 850 m and in the eastern districts of Zimbabwe and in Mozambique between 1 500 m and 2 500 m. Map 200.

Vouchers: Fisher 814 (BM; NH; NU; PRE); Schelpe 6262 (BM; BOL); Schweickerdt s.n. (PRE; STE).

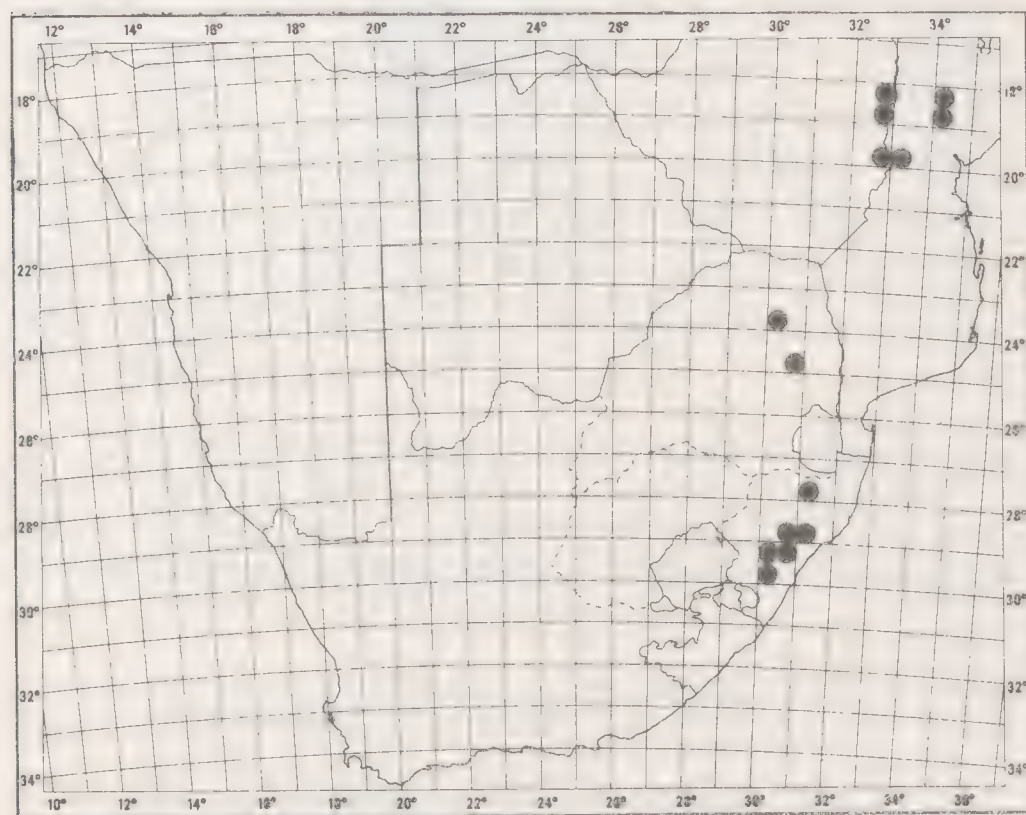
2. ***Elaphoglossum hybridum* (Bory) Brack.** in U.S. Expl. Exped. 16: 69 (1854); Sim, Ferns S. Afr. edn 2: 288, t. 151 fig. 1 (1915); Schelpe in Contr. Bolus Herb. 1: 32 (1969); in F.Z. Pterid.: 213 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 420, t. 314 (1983). Type: Réunion, Caverne Le Gentil, Bory s.n. (P, holo.).

*Acrostichum hybridum* Bory, Voy 3: 95 (1804). *Olfersia hybrida* (Bory) Presl, Tent. Pterid. 235 (1836), reimpr. in Abh. K. Böhm. Ges. Wiss., ser. 4, 5: 235 (1837).

Rhizome up to 4 mm in diameter, set with dark brown, lanceolate, attenuate, entire rhizome-scales up to  $6 \times 1$  mm. Fronds clustered, arching, firmly herbaceous; stipe stramineous to pale brown, fairly densely set with scales, becoming subglabrous with age; sterile lamina very narrowly oblong to very narrowly elliptic (or narrowly elliptic in small fronds), acuminate, set mainly along margin and midrib with dark brown scales c. 1.5 mm long (smaller along margin) and with substellate scales on lamina surface, base narrowly to broadly cuneate, abruptly decrescent or not; midrib shallowly sulcate above, convex below; fertile lamina narrowly oblong, acute, up to  $125 \times 30$  mm, narrowly ovate in small fronds, base broadly cuneate, hardly decurrent.

Eastern Cape Province, Natal, Zimbabwe, Mozambique, Malawi, Tanzania, Kenya, Cameroun, Fernando Po, Comoro Islands, Madagascar, Mauritius, Réunion, Tristan da Cunha, Gough Island, as well as tropical America. *E. hybridum* is confined to moist deeply shaded habitats in forest, growing on moss covered boulders or as a low-level epiphyte, 1 600–2 500 m. Fertile fronds are infrequently produced. Map 201.

Vouchers: McLoughlin 106 (PRE); Sim s.n. (GRA; PRE).



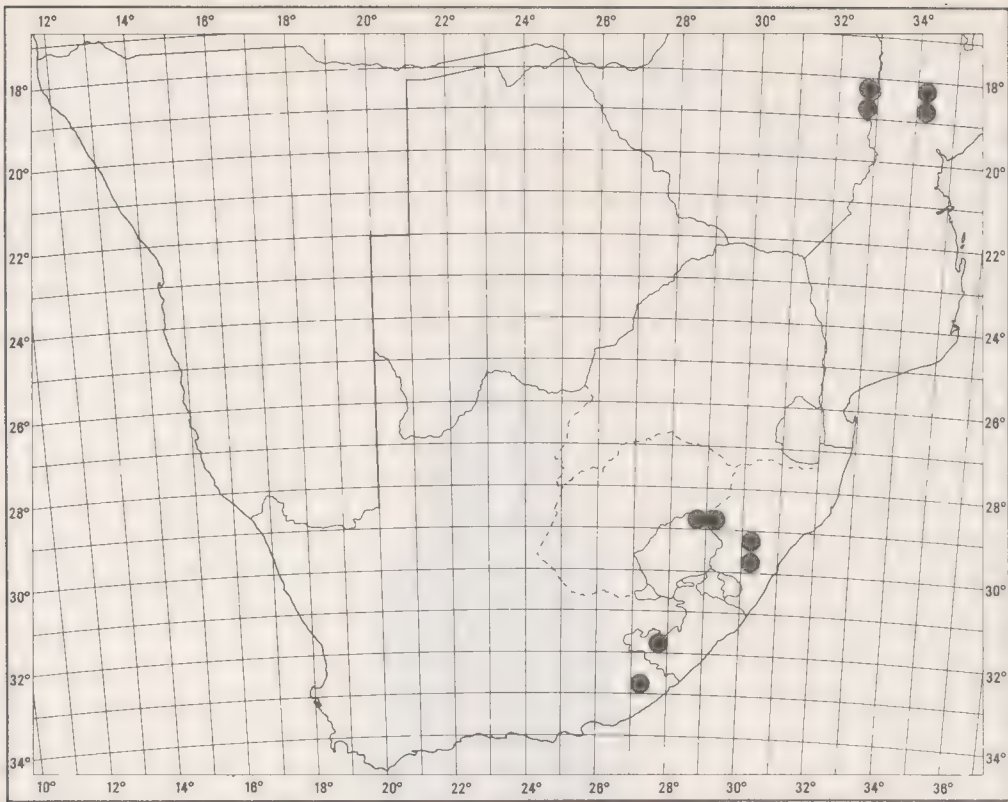
MAP 200.—*Elaphoglossum aubertii*





FIG. 78.—1, *Elaphoglossum drakensbergense*, plant,  $\times 0,6$ ; 1a, detail of upper surface of lamina,  $\times 2,1$  (Esterhuy-  
sen 26052); 1b, lamina scale,  $\times 30$ . 2, *Elaphoglossum spathulatum*, plant,  $\times 0,6$  (Buchanan sub BOL 23548); 2a, lamina  
scale,  $\times 30$ .



MAP 201.—*Elaphoglossum hybridum*

3. *Elaphoglossum spathulatum* (Bory) T. Moore, Ind. Fil. 14 (1857); Sim, Ferns S. Afr. edn. 2: 291, t. 150 fig. 1 (1915); Schelpe in Contr. Bolus Herb. 1: 33 (1969); in F.Z. Pterid.: 213 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 422, t. 316 (1983). Type: Réunion, R. St Denis, Bory s.n. (P, holo.!—BOL, illustr.!).

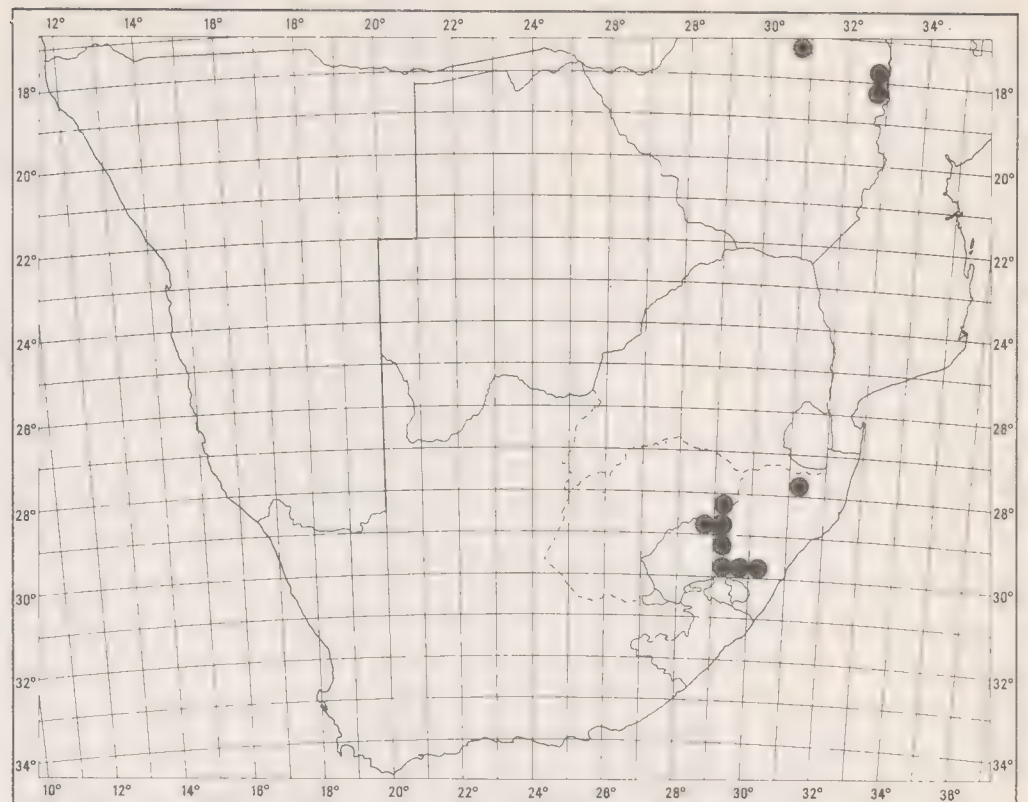
*Acrostichum spathulatum* Bory, Voy. 1: 363, t. 20 fig. 1 (1804). *Olfersia spathulata* (Bory) Presl, Tent. Pterid. 233 (1836), reimpr. in Abh. K. Böhm. Ges. Wiss., ser. 4, 5: 233 (1837).

Rhizome short, 1,5 mm in diameter, set with pale brown, lanceolate, attenuate, subentire rhizome-scales up to 4 mm long. *Fronds* clustered, erect, firmly membranous; *stipe* stramineous, up to 40 mm long in fertile fronds and 17 mm in sterile fronds, densely set with squarrose, lanceolate, longly acuminate, somewhat involute, pale brown scales up to 2 mm long; *sterile lamina* narrowly oblanceolate to spathulate, obtuse, up to  $45 \times 9$  mm, set on both surfaces with pale brown, involute, entire scales up to 2 mm long, base longly decurrent; *fertile lamina* broadly elliptic to circular, obtuse, up to  $18 \times 10$  mm, set with scales persistent mainly along midrib. Fig. 78: 2.

Natal and north-eastern Orange Free State, Zimbabwe, Mozambique, Malawi, Zambia, Tanzania, Kenya, Madagascar, Réunion and Sri Lanka. Sheltered rock faces and crevices in montane forest and partial shade on south aspect slopes, 1 100–2 800 m altitude. Map 202.

Vouchers: Esterhuysen 10208 (BOL; NBG; PRE); Schlechter 6919 (BM; BOL; GRA; K; PRE).

4. *Elaphoglossum drakensbergense* Schelpe in Jl S. Afr. Bot. 34: 237, t. 2 (1968);

MAP 202.—*Elaphoglossum spathulatum*

W. B. G. Jacobsen, Ferns Sthn Afr. 426, t. 321 (1983). Type: Natal, Drakensberg, Injasuti area, Esterhuysen 26052 (BOL, holo.!; B!; BM!; C!; GH!; K!; M!; MO!; P!; PR!; PRE!; S!).

Rhizome up to 145 mm long, c. 1 mm in diameter, set with castaneous, narrowly lanceolate, attenuate, serrulate, hair-pointed rhizome-scales up to  $4 \times 4$  mm. *Fronds* erect, spaced c. 5 mm apart, membranous; *stipe* brown (with a darker phyllopodium c. 5 mm long), up to 145 mm long, set with squarrose, pale brown, lanceolate, attenuate, serrulate scales up to 2 mm long; *sterile lamina* narrowly-oblong, acute, up to  $65 \times 18$  mm, set with pale brown, lanceolate, serrulate scales up to 1,5 mm long on both surfaces, base broadly cuneate; *midrib* not very prominent; *fertile lamina* narrowly oblong to elliptic, up to  $32 \times 10$  mm, acute to rounded, base broadly cuneate to truncate, hardly decrescent. Fig. 78: 1.

Endemic to the Natal Drakensberg, between 2 100 and 3 200 m altitude. Sheltered rock faces and crevices in partial shade, usually on south aspect slopes. Map 203.

Vouchers: Esterhuysen 27828, 27840 (BOL); Schelpe 7671 (BOL).

5. *Elaphoglossum macropodium* (Fée) T. Moore, Ind. Fil. 11 (1857); Schelpe in Contr. Bolus Herb. 1: 31 (1969); in F.Z. Pterid.: 211 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 419, t. 313 (1983). Type: Réunion, Herb. Bory (P, holo.).

*Acrostichum macropodium* Fée, Mém. Fam. Foug. 2: 30, t. 6 fig. 2 (1845).



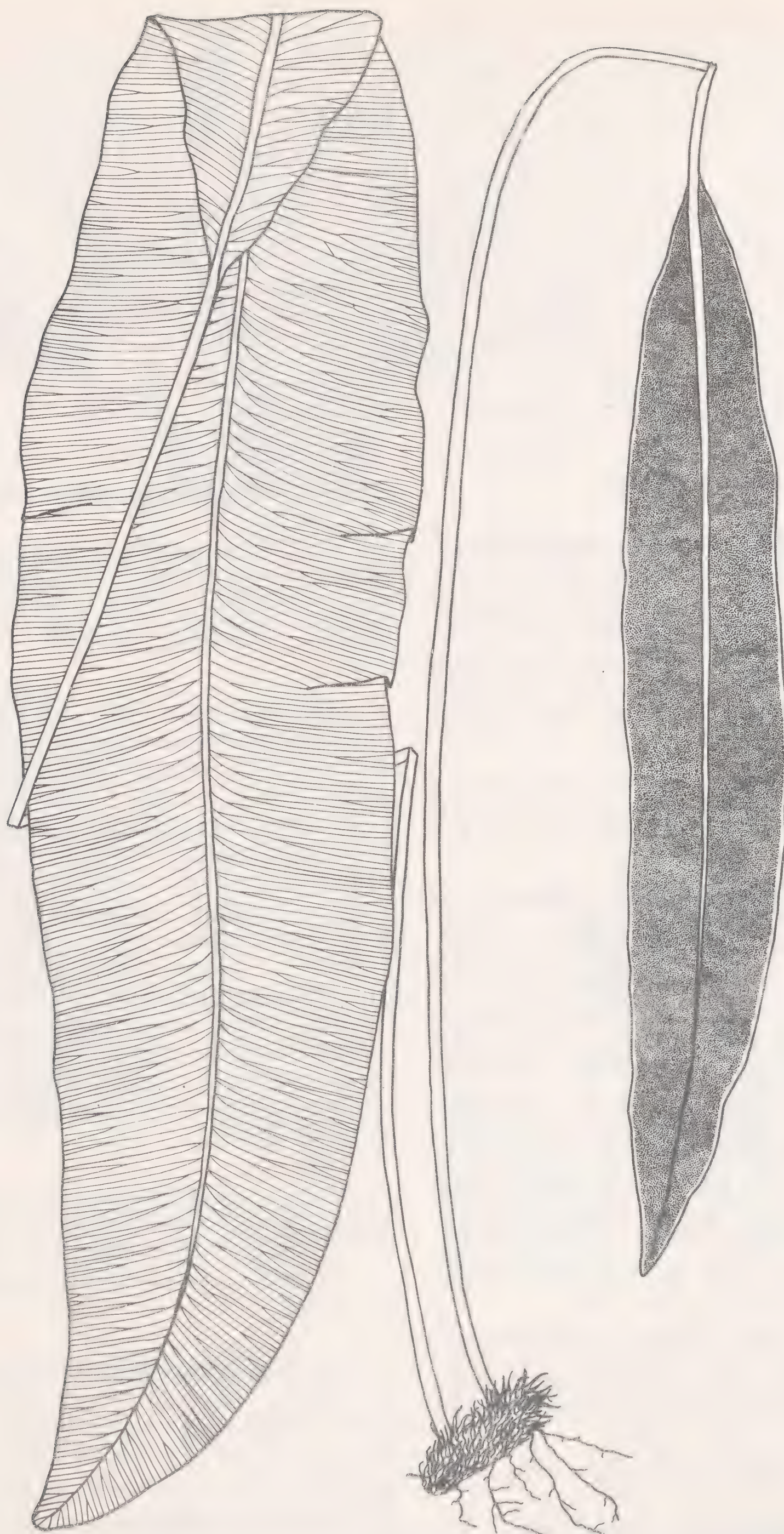
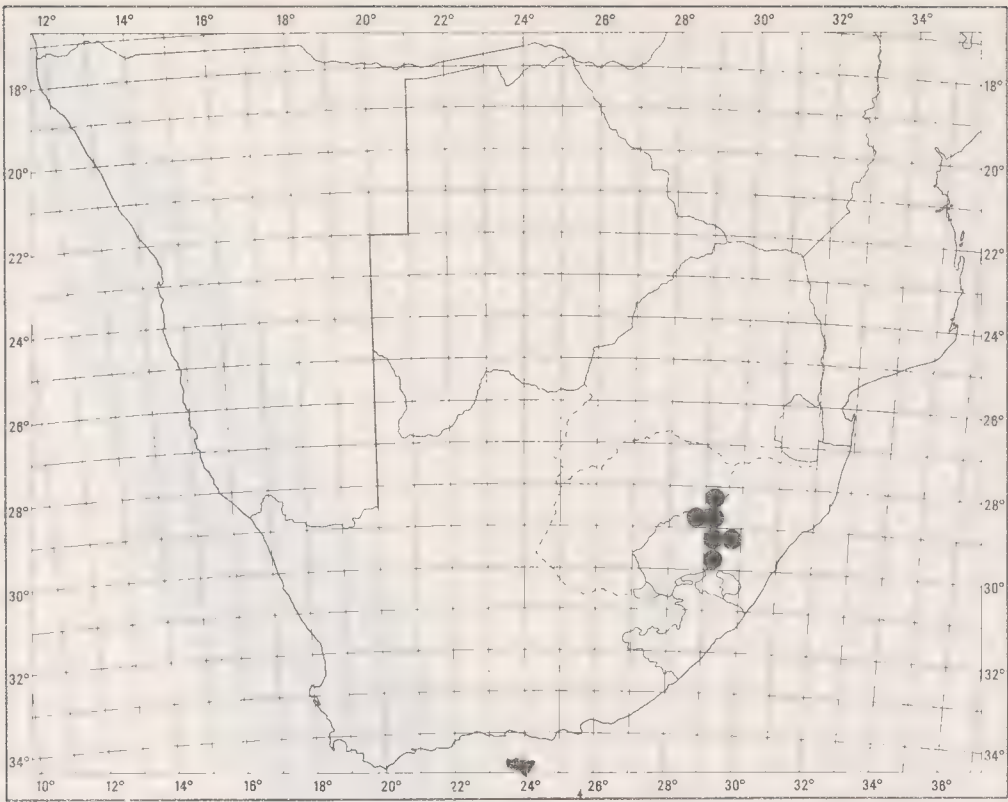


FIG. 79.—*Elaphoglossum macropodium*, part of plant,  $\times 0,6$  (Schelpe 5742).



MAP 203.—*Elaphoglossum drakenbergense*

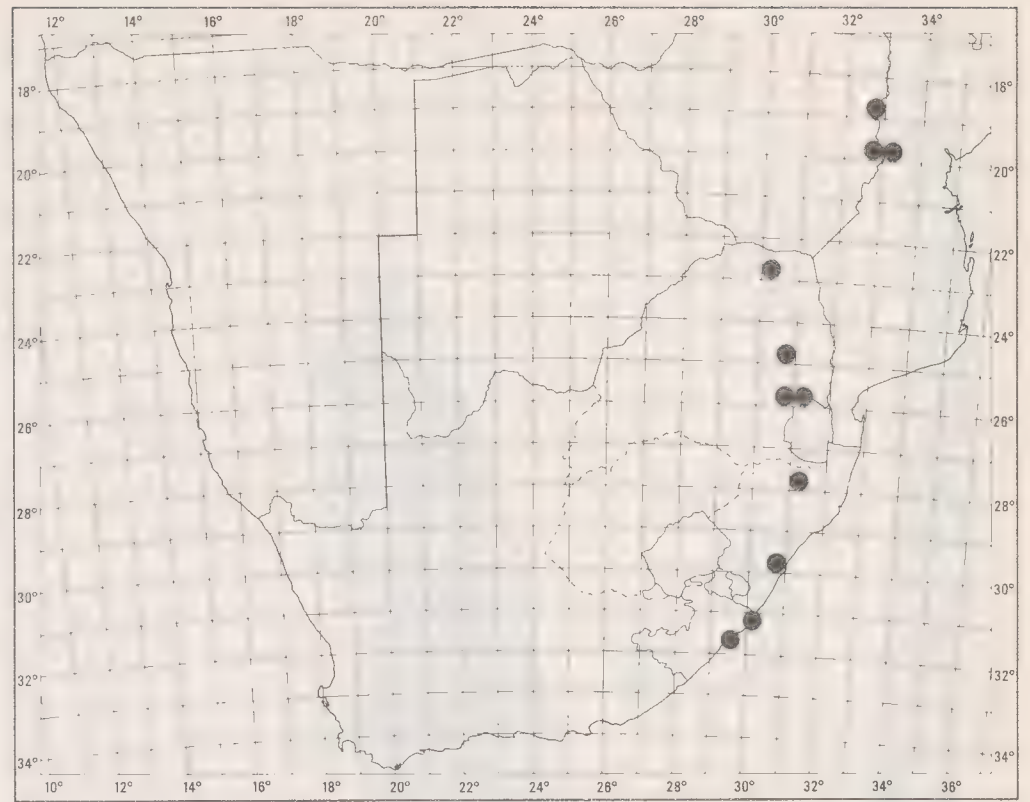
*Elaphoglossum conforme* var. *latifolium* Sim, Ferns S. Afr. edn. 2: 286, t. 148 (1915). Syntypes: Natal, *Buchanan* s.n. (K!); *Medley Wood* s.n. (PRE); Zimbabwe, Mt Pene, *Swynnerton* 6009.

Rhizome c. 5 mm in diameter, set with squarrose, pale brown, concolorous, narrowly lanceolate, attenuate, irregularly fimbriate rhizome-scales up to  $12 \times 2$  mm. *Fronds* erect, closely spaced, thickly coriaceous; *stipe* pale brown, darker brown and set with scales at extreme base, otherwise glabrous, up to 0,24 m long; *sterile lamina* broadly elliptic, up to  $360 \times 80$  mm, acuminate (broadly acute to broadly obtuse in smaller fronds), base broadly cuneate and scarcely decurrent, set with minute, very scattered, substellate scales less than 0,5 mm in diameter; midrib shallowly sulcate above, convex below; *fertile lamina* oblong-lanceolate, up to  $260 \times 40$  mm, acute, base shortly decurrent. Fig. 79.

Transkei, Natal, Transvaal, Zimbabwe, Mozambique, Malawi, Tanzania and Réunion. Also reported from Comoro Islands, Seychelles and Mauritius by Tardieu-Blot (1960). *E. macropodium* occurs either in rock crevices or as a low-level epiphyte in sheltered forest habitats from near the coast at Port St Johns to c. 3 000 m in the eastern districts of Zimbabwe. Map 204.

Vouchers: *Hardcastle* 64 (PRE); *Schweickerdt* 1630 (BM; NU; PRU); *Strey* 7244 (BOL; NH); *Taylor* 2602 (NBG).

In his treatment of *Elaphoglossum* in Southern Africa, Roux (1982) lectotypified *E. conforme* var. *latifolium* (Inanda and Great Noodsberg, *Buchanan* s.n.—NH) and placed it as a synonym under *E. angustatum* (Schrad.) Hieron. However, Sim's plate 148 is an illustration of *E. macropodium*, and this is noted by Roux under that species.

MAP 204.—*Elaphoglossum macropodium*

6. *Elaphoglossum conforme* (Swartz) J. Sm. in Hooker, J. Bot. 4: 148 (1841); Schelpe in Contr. Bolus Herb. 1: 29 (1969); W. B. G. Jacobsen, Ferns Sthn Afr. 416, t. 310 (1983). Type: St Helena, *Masson* s.n., Herb. Thunberg 24405 (UPS, holo.!).

*Acrostichum conforme* Swartz, Syn. Fil. 10, 192, t. 1 fig. 1 (1806). *Olfersia conformis* (Swartz) Presl, Tent. Pterid. 235 (1836).

*Acrostichum oblongum* Desv. in Mag. Ges. Naturf. Berl. 5: 308 (1811). Type: Cape of Good Hope, Herb. Desvaux (P, holo.!).

*Acrostichum glandulosum* Carm. ex Hook. & Grev., Ic. Fil. t. 3 (1830). *Acrostichum conforme* var. *glandulosum* (Carm. ex Hook. & Grev.) Fée, Mém. Fam. Foug. 2: 31 (1845). Type: Cape of Good Hope, *Carmichael* s.n. (K, holo.!—BOL, photo.!).

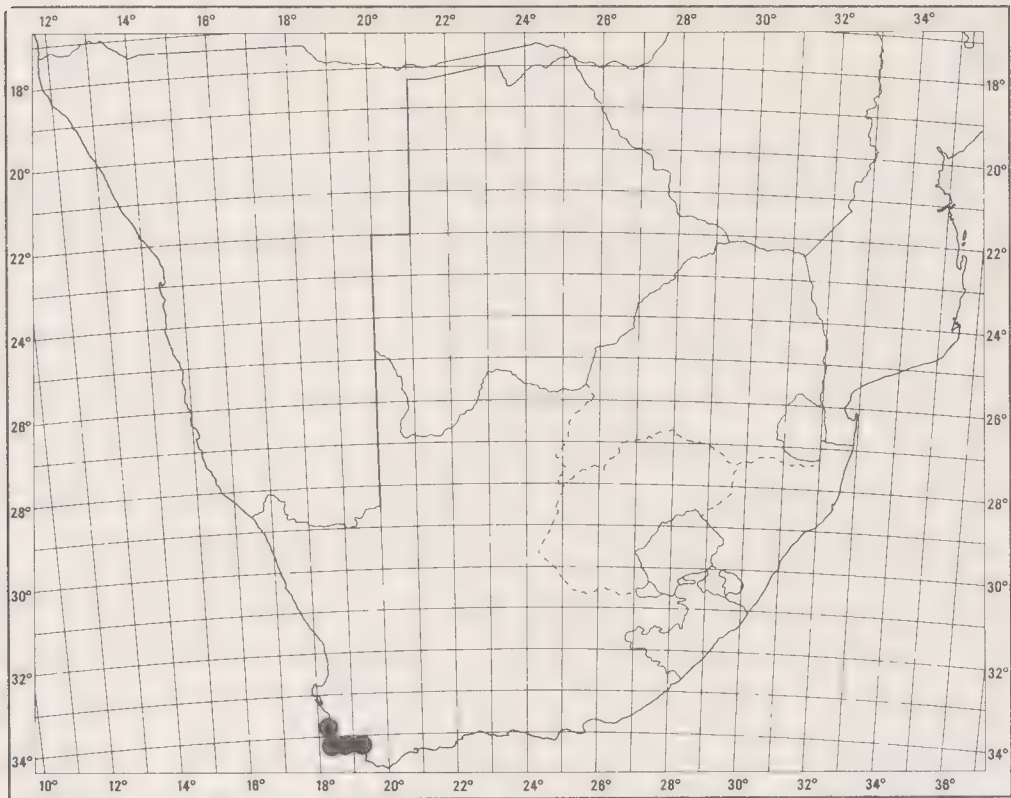
*Acrostichum viscosum* var. *rupestre* Sim, Ferns S. Afr. edn 1: 222, t. 82 fig. 2 (1892), pro parte. *Elaphoglossum petiolatum* var. *rupestre* (Sim) Sim, Ferns S. Afr. edn 2: 288, t. 150 fig. 2 (1915). Type: Cape Province, Cape Peninsula, *Bolus* 3899 (BOL, lecto.!).

Rhizome c. 3 mm in diameter, set with squarrose, concolorous brown, narrowly ovate, acuminate, subentire rhizome-scales up to  $6 \times 2$  mm. *Fronds* erect, spaced 3–18 mm apart, carnosely coriaceous, glandular-viscid when young; *stipe* pale brown with a darker phyllopodium, 5–55 mm long, scaly, becoming glabrous with age; *sterile lamina* elliptic to narrowly-elliptic-oblong,  $25\text{--}95 \times 9\text{--}23$  mm, obtuse, set with rounded pale-edged scales less than 0,5 mm in diameter and persistent ovate-acute, brown scales up to  $1,5 \times 1$  mm along under surface of midrib, base cuneate, shortly decurrent, margin entire, narrowly involute, pale, usually punctate below at sites of viscid glands;









MAP 205.—*Elaphoglossum conforme*

midrib slightly convex above, prominent below, *fertile lamina* oblong-elliptic to oblong-lanceolate,  $20-95 \times 10-21$  mm, base broadly cuneate. Fig. 80: 2.

South-western Cape Province, Kenya, Uganda, Tanzania, Zaire and St Helena. Also reported from Liberia (Alston, 1959). Sheltered south aspect mossy ledges on outcrops in Restioveld in western Cape Province at altitudes of c. 1 000 m. Map 205.

Vouchers: *Esterhuysen* 30540 (B; BM; BOL; C; GH; M; MO; P; PR; PRE; S); 30541 (B; BM; BOL; C; GH; M; MO; NBG; P; PR; PRE; S).

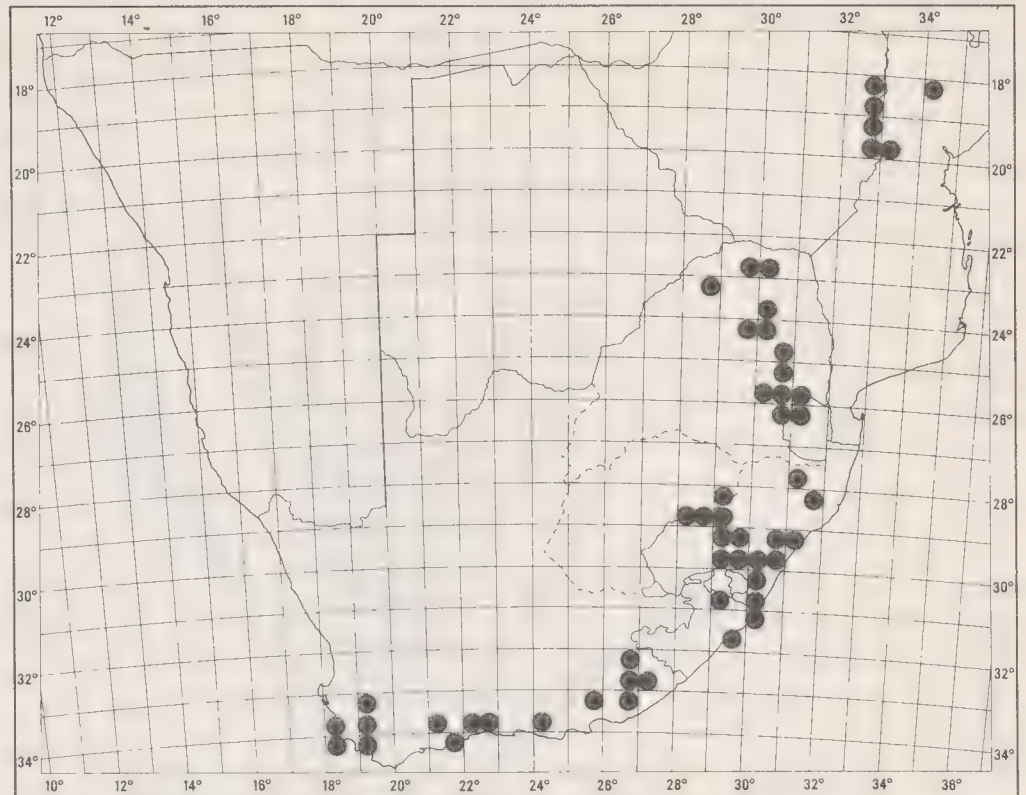
The viscid immature fronds provide a useful field character.

**7. *Elaphoglossum acrostichoides* (Hook. & Grev.) Schelpe** in JI S. Afr. Bot. 30: 196 (1964); in Contr. Bolus Herb. 1: 29 (1969); in F.Z. Pterid.: 210 (1970); in C.F.A. Pterid.: 164 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 413, t. 309 (1983). Type: Cape of Good Hope, *Carmichael* s.n., Herb. Hooker (K, holo.).

*Vittaria acrostichoides* Hook. & Grev., Ic. Fil. t. 186 (1830). *Drymoglossum acrostichoides* (Hook. & Grev.) T. Moore, Ind. Fil. 31 (1857).

*Elaphoglossum petiolatum* sensu Sim, Ferns S. Afr. edn 2: 287, t. 149 fig. 2 (1915), non (Swartz) Urban (1903).

Rhizome c. 3 mm in diameter, set with subentire rhizome-scales up to  $6 \times 1,2$  mm, concolorous pale brown or castaneous in upper half, with occasional filamentous outgrowths along margin. *Fronds* spaced 5–10 mm apart, thinly coriaceous; *stipe* pale brown strami-



MAP 206.—*Elaphoglossum acrostichoides*

neous, with a darker phyllopodium, up to 220 mm long, set with pale brown scales, *stipe* of fertile frond usually longer than that of sterile frond; *sterile lamina* very narrowly elliptic-acuminate up to  $350 \times 35$  mm, set with stellate scales less than 0,5 mm in diameter on both surfaces, base cuneate, shortly to longly decurrent, margin entire to shallowly irregularly undulate; midrib sulcate above; veins obscure, c. 0,8 mm apart; *fertile lamina* linear, acute to acuminate, up to  $170 \times 15$  mm, base narrowly cuneate, attenuate. Fig. 80: 1.

From south-western Cape Province through Transkei, Natal, Lesotho, north-eastern Orange Free State, Swaziland and Transvaal to Zimbabwe, Mozambique, Zambia, Angola, Uganda, Kenya, Tanzania, Cameroun, Liberia, Guinea and Ivory Coast, São Tomé, Fernando Po and Madagascar. A common epiphytic or lithophytic species in the montane forests of eastern Cape Province and Natal northwards; it occurs less frequently in sheltered rock crevices in south-western Cape Province. Generally found at higher altitudes up to c. 2 800 m. Map 206.

Vouchers: *Codd & Dyer* 9108 (BOL; PRE); *Compton* 27849 (NBG; PRE); *Esterhuysen* 30546 (B; BM; BOL; MO; P; PR; PRE); *Jacobsen* 3804 (BOL; SRGH); *Schlechter* 6917 (BM; PRE; SAM).

**8. *Elaphoglossum angustatum* (Schrad.) Hieron.** in Bot. Jb. 46: 403 (1911); W. B. G. Jacobsen, Ferns Sthn Afr. 417, t. 311 (1983). Type: Cape Province, *Hesse* s.n. (LE, holo.!—BOL, photo.!!; GOET).

*Acrostichum angustatum* Schrad. in Gött. Gel. Anz. 1818: 915 (1818). *Olfersia angustata* (Schrad.) Presl, Tent. Pterid. 234 (1836).





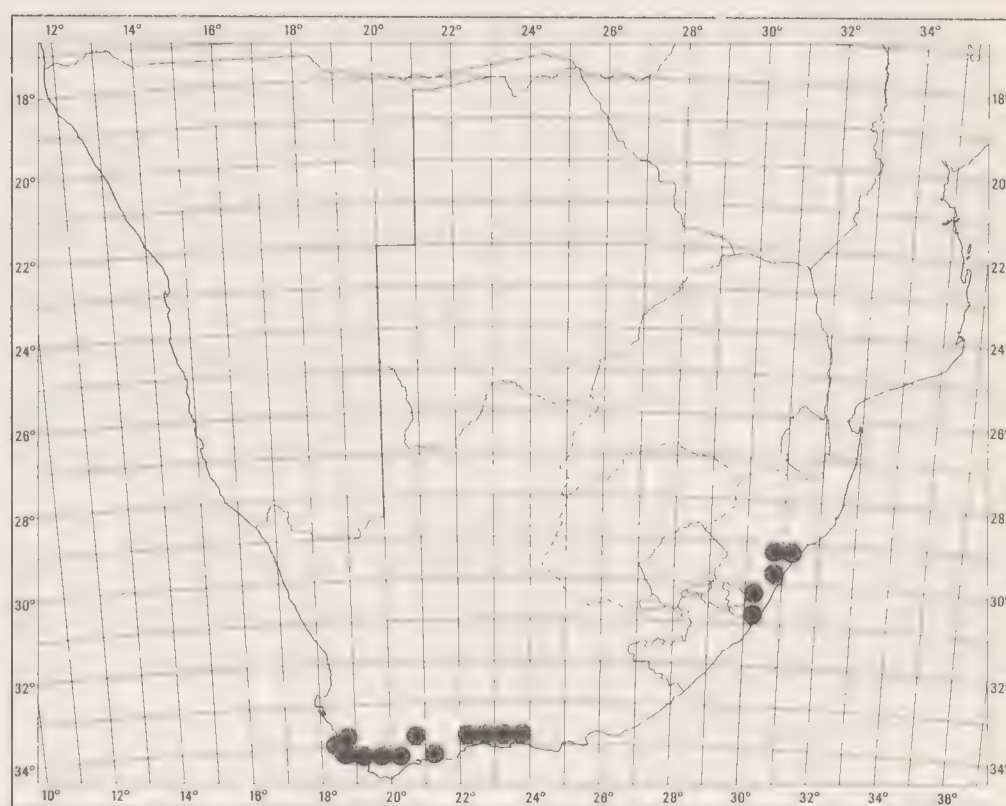
FIG. 81.—1, *Bolbitis heudelotii*, sterile frond,  $\times 0,6$  (Chase 6638); 1a, fertile frond,  $\times 0,6$  (Chase 2189); 1b, detail of portion of sterile pinna,  $\times 1,8$  (Chase 2189).



*Elaphoglossum conforme* sensu Sim, Ferns S. Afr. edn 2: 285, t. 147 (1915).

Rhizome up to 6 mm in diameter, set with appressed, dark brown, narrowly ovate to lanceolate, attenuate, fimbriate rhizome-scales up to  $6 \times 1,8$  mm. *Fronds* erect to arching, spaced 5–10 mm apart, carnose-coriaceous, never glandular viscid; *stipe* stramineous, with a dark brown phyllopodium, up to 310 mm long, stipe of fertile frond usually much longer than that of sterile frond; *sterile lamina* oblanceolate (rarely narrowly oblong), c.  $85\text{--}245 \times 18\text{--}60$  mm, obtuse, set with stellate scales less than 0,5 mm in diameter on both surfaces, base very narrowly cuneate decurrent, margin entire or undulate; midrib convex above when fresh (subsulcate when dry); *fertile lamina* linear to very narrowly oblong acute,  $95\text{--}140 \times 11\text{--}17$  mm, base narrowly cuneate decurrent. Fig. 80: 3.

South-western Cape Province to Natal, usually on humus-strewn boulders in deep shade in forest. In southern and eastern Cape Province it occurs between 280 and 660 m



MAP 207.—*Elaphoglossum angustatum*

elevation, but in Natal its altitudinal limits appear from 500 m to 1 000 m. Map 207.

Vouchers: *Compton* 13535 (NBG; PRE); *Esterhuysen* 29016 (BM; BOL; MO); *Medley Wood* s.n. (BOL; PRE; SAM); *Schelpe* 6553 (B; BOL; C; K; M; MO; P; PR; PRE; S).

## 2. BOLBITIS

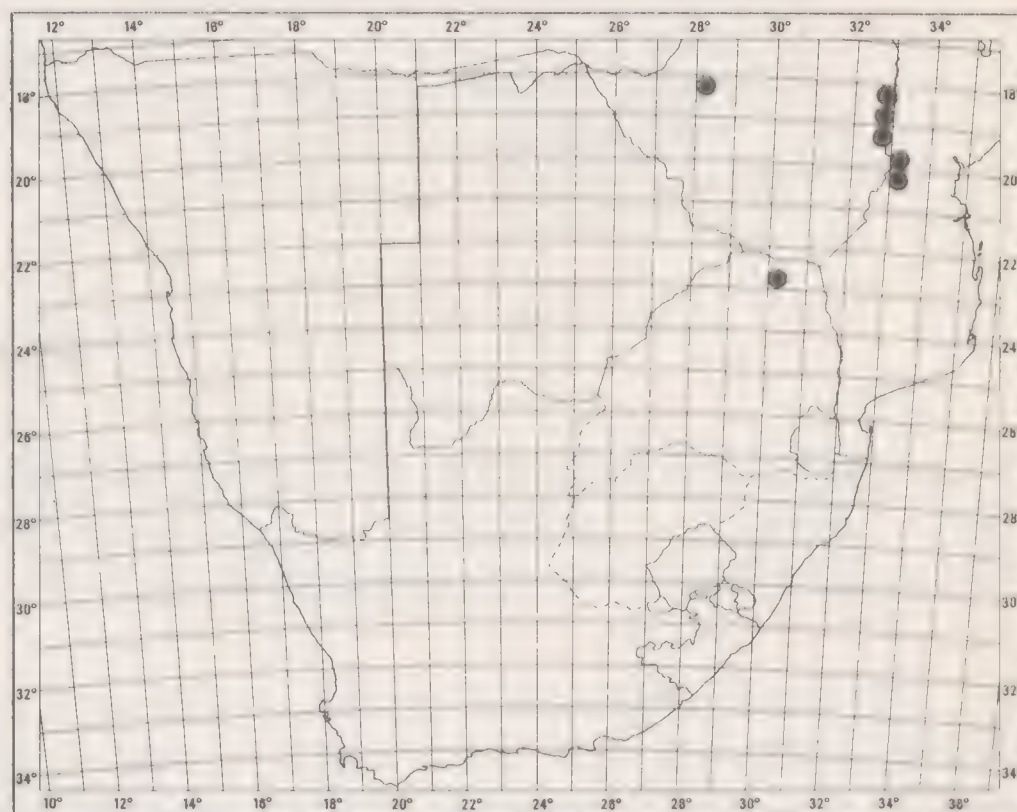
**Bolbitis** Schott, Gen. Fil. 3, t. 14 (1935); Tardieu-Blot in Mém. Inst. fr. Afr. noire 28: 109 (1953); Alston in F.W.T.A. edn 2, Suppl. 68 (1959); Tardieu-Blot in Fl. Madag. 5, 2: 57 (1960); in Fl. Gabon 8: 183 (1964); in Fl. Camer. 3: 314 (1964); Schelpe in F.Z. Pterid.: 218 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 87 (1973); in C.F.A. Pterid.: 168 (1977); Hennipman, Monog. Bolbitis (1977). Type species: *B. serratifolia* (Mertens ex Kaulf.) Schott (= *Acrostichum serratifolium* Mertens ex Kaulf.).

Rhizome creeping, set with dark, entire rhizome-scales. *Fronds* closely spaced, weakly dimorphic, gemmiferous in some species; *stipes* not articulated; mature fronds usually pinnate; *sterile pinnae* glabrous, usually crenate; *fertile pinnae* acrostichoid; *veins* anastomosing.

A tropical genus of 44 species and 13 hybrids mostly in Asia but with 8 species and 2 hybrids in tropical Africa, only one of which occurs in our area.

**Bolbitis heudelotii** (Bory ex Fée) Alston in J. Bot., Lond. 72, Suppl. Pterid. 2: 3 (1934); Schelpe in Contr. Bolus Herb. 1: 41 (1969); in F.Z. Pterid.: 218, t. 62 (1970); in C.F.A. Pterid.: 170, t. 30 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 428, t. 323 (1983). Type: Guinea, Fouta-Djallon, Herb. Bory, *Heudelot* 805 (P, holo.!: B; K; L).

*Gymnopteris heudelotii* Bory ex Fée, Mém. Fam. Foug. 2, Acrost. 84, t. 45 (1845). *Anapausia heudelotii* (Bory ex Fée) Presl, Epim. Bot. 187 (1849). *Acrostichum heudelotii* (Bory ex Fée) Hook., Sp. Fil. 5: 264 (1864). *Chrysodium heudelotii* (Bory ex Fée) Kuhn, Fil. Afr. 51 (1868). *Leptochilus heudelotii* (Bory ex Fée) C. Chr., Ind. Fil. 385 (1906); Sim, Ferns S. Afr. edn 2: 122, t. 33 (1915). *Campium heudelotii* (Bory ex Fée) Copel. in Philipp. J. Sci. 37: 396 (1928).



MAP 208.—*Bolbitis heudelotii*



Rhizome up to 10 mm in diameter, set with very dark brown, lanceolate, acuminate, entire rhizome-scales c. 3 mm long. *Fronde*s spaced up to 30 mm apart, arching, firmly membranous, slightly dimorphous; *stipe* up to 290 mm long and 4 mm in diameter, glabrous or set with a few scales; *sterile lamina* ovate-oblong, up to 270 × 170 mm, pinnate or pinnatifid, *pinnae* oblong-lanceolate, acute to acuminate, up to 75 × 12 mm, entire to weakly crenate, base unequally cuneate to decurrent, glabrous, *rhachis* and *costae* set with dark brown, ovate, entire scales up to 2 mm long when

young, becoming glabrous with age; *fertile lamina* narrowly oblong-lanceolate, pinnate, *pinnae* lanceolate-acuminate, entire, up to 100 × 14 mm, petiolate or with unequally cuneate decurrent bases, glabrous. *Sori* acrostichoid. Fig. 81.

Transvaal, Zimbabwe, Mozambique, Zambia, Angola, Kenya, Uganda, Tanzania, Cameroun, Nigeria, Ghana, Ivory Coast, Sierra Leone and Liberia. On wet or partially submerged rocks in streambeds, usually in deep shade in forest, c. 900–1 600 m. Map 208.

Voucher: Wager s.n. (PRE).

### ASPIDIACEAE/DRYOPTERIDACEAE

Terrestrial ferns with creeping or erect, dictyostelic rhizomes set with non-clathrate, non-peltate rhizome-scales. *Stipes* not articulated to rhizome, with 2–7 vascular bundles. *Lamina* mostly 2- to 4-pinnatifid, often with lower pinnae basiscopically developed, glabrous or set with scales or unicellular or multicellular hairs; *pinnae* not articulated to rhachis; *rhachis* groove glabrous or scaly but not with multicellular hairs; *veins* free or anastomosing. *Sori* superficial, circular, with or without peltate or reniform indusia. *Spores* monolet, usually with perispore.

- 1a Pinna costa (or secondary rhachises) with raised edges on upper surface:
  - 2a Pinnules dimidiate, articulated; sori oblong elliptic..... 2. *Didymochlaena*
  - 2b Pinnules neither dimidiate nor articulated; sori circular:
    - 3a Indusia peltate; lower pinnae not developed basiscopically..... 5. *Polystichum*
    - 3b Indusia reniform; lower pinnae often developed basiscopically:
      - 4a Pinnule margins crenate to serrate; basal pinnae not as long as lamina..... 3. *Dryopteris*
      - 4b Pinnule margins aristate-dentate; basal pinnae almost as long as lamina itself..... 6. *Arachniodes*
- 1b Pinna costa without raised edges on upper surface:
  - 5a Lamina pinnate..... 4. *Cyrtomium*
  - 5b Lamina 2- to 4-pinnatifid:
    - 6a Indusium basal, cup-shaped at maturity ..... 1. *Woodsia*
    - 6b Indusium peltate or reniform:
      - 7a Veins free:
        - 8a Indusia peltate; lamina glabrous ..... 7. *Rumohra*
        - 8b Indusia reniform; lamina pubescent or pilose:
          - 9a Indusia densely pilose with long white unicellular hairs; upper surface of costae pilose with unicellular hairs..... 8. *Hypodematum*
          - 9b Indusia glabrous, pubescent or very thinly pilose; upper surface of costae densely set with short multicellular hairs ..... 9. *Ctenitis*
      - 7b Veins anastomosing ..... 10. *Tectaria*

### 1. WOODSIA

*Woodsia* R. Br., Prodr. 158 (1810); Tardieu-Blot in Fl. Madag. 5, 1: 303 (1958); Brown in Nova Hedw. Beih. 16: 1–154 (1964); Schelpe in C.F.A. Pterid.: 173 (1977). Lectotype species: *W. ilvensis* (L.) R. Br. (= *Acrostichum ilvense* L.).

Rhizome dictyostelic. *Fronde*s herbaceous, pinnate or bipinnate, pubescent or pubescent and paleate; *venation* free. *Sori* round, dorsal on lamina, subterminal or dorsal on veins, without paraphyses; *indusium* basal, fragile, globose, opening apically. *Spores* monolet with a more or less conspicuously reticulate perispore.



A genus of about 40 species; alpine and arctic, northern hemisphere as well as South America, Angola and Southern Africa.

- Stipe without numerous persistent scales at the base; pinnatifid segments closely spaced or overlapping ..... 1. *W. montevidensis* var. *burgessiana*  
Stipe with numerous persistent scales at the base; pinnatifid segments widely spaced, not overlapping..... 2. *W. angolensis*

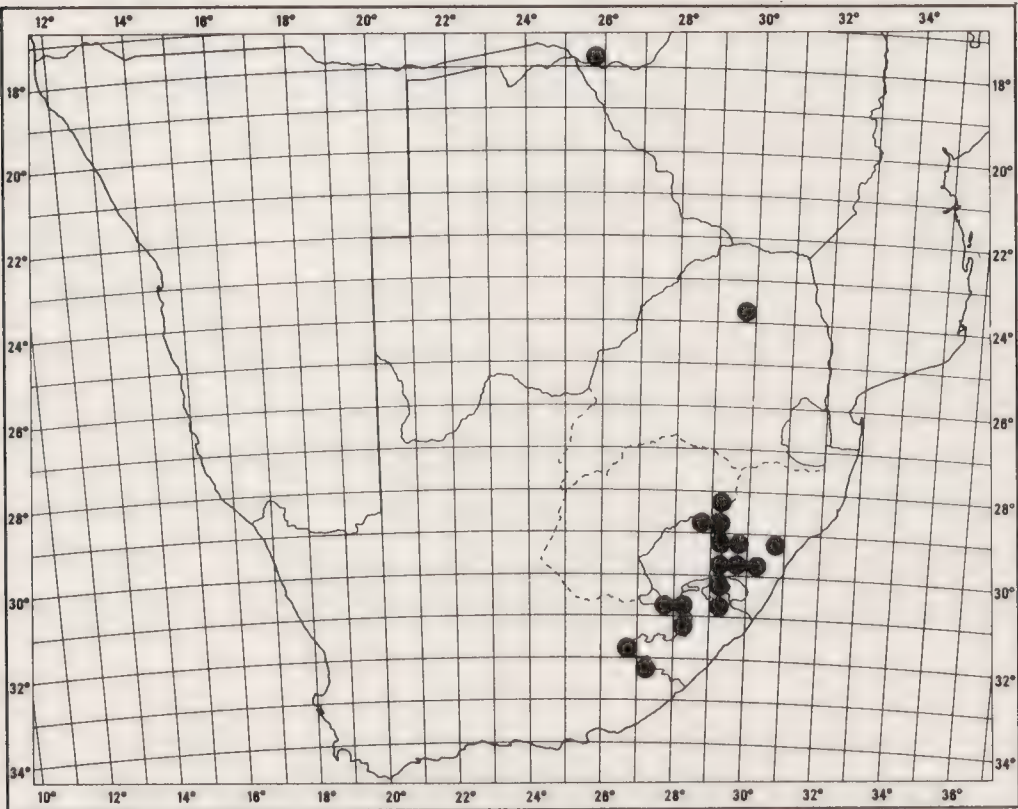
1. **Woodsia montevidensis** (Spreng.) Hieron. in Bot. Jb. 22: 363 (1897). Type: Montevideo, *Sello* 517 (B, holo.).

The typical variety does not occur in Southern Africa.  
Var. **burgessiana** (Gerr. ex Hook. & Bak.) Schelpe in Jl S. Afr. Bot. 35: 138 (1969); W. B. G. Jacobsen, Ferns Sthn Afr. 430, t. 9, 324 (1983). Type: Natal, near the Tugela River, *Gerrard & McKen* s.n. (K,holo.!, S!; SAM!; TCD).

*Woodsia burgessiana* Gerr. ex Hook. & Bak., Syn. Fil. edn 1: 48 (1868); Sim, Ferns S. Afr. edn 2: 86, t. 44 fig. 2 (1915).

Rhizome creeping, set with subentire rhizome-scales with a black central stripe and pale borders, up to 6 × 1,5 mm. *Fron*ds tufted, herbaceous; *stipe* stramineous, darker basally, c. 40 mm long, set with minute glandular hairs and a few scales, becoming subglabrous; *lamina* narrowly ovate-lanceolate, pinnate to 2-pinnatifid, lower pairs of pinnae decrescent; *pinnae* sessile, rounded-oblong, deeply pinnatifid into overlapping rhombic, dentate lobes, set on both surfaces with short multicellular hairs, mainly along under surfaces of veins; *rhachis* stramineous, sulcate above, pilose with glandular hairs. *Sori* c. 1 mm diameter; *indusium* lace-rate. Fig. 82:1.

Eastern Cape Province, Transkei, Natal, Transvaal, Zimbabwe and Madagascar. Rocky habitats, c. 1 300 m to 3 150 m. Map 209.



MAP 209.—*Woodsia montevidensis* var. *burgessiana*

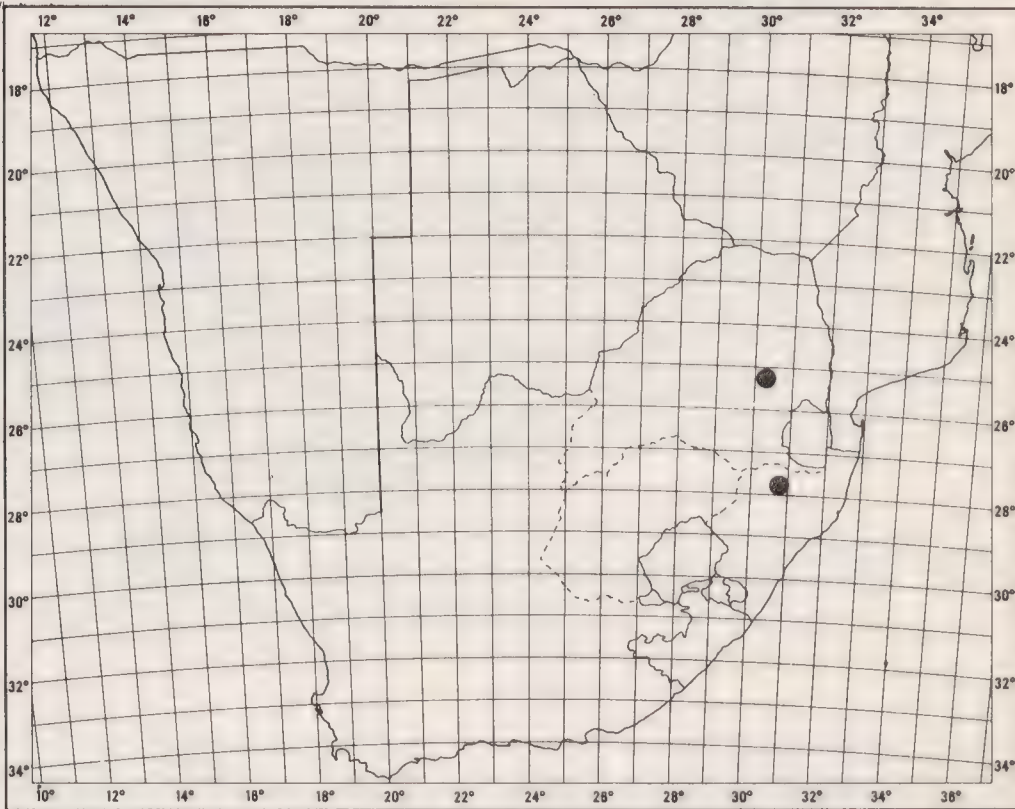
Vouchers: *Galpin* 6932 (BOL; GRA; K; NH; SAM); *Hilliard & Burt* 8986 (E; MO; NU; PRE); *Schlechter* 4705 (BOL; GRA; K; PRE).

2. **Woodsia angolensis** Schelpe in Garcia de Orta, sér. Bot. 3: 53 (1976); in C.F.A. Pterid.: 173, t. 31 (1977). Type: Angola, Huila, Lubango, Serra da Chela, Tundavala, *Borges* 131 (LISC, holo.!, COI.!, LUAI!).

Rhizome creeping, set with narrowly lanceolate, entire rhizome-scales with a dark brown central stripe and pale brown borders, c. 5 × 1 mm. *Fron*ds tufted, herbaceous; *stipe* stramineous, up to 55–70 mm, set with broadly lanceolate, concolorous brown scales up to 4,5 mm long; *lamina* elliptic or narrowly obovate, pinnate to 2-pinnatifid, basal pinnae reduced; *pinnae* pinnatifid into widely spaced, oblong, crenate-dentate lobes, hairy above, with yellow glands below, and sparsely hairy along costae; *rhachis* stramineous, set with multicellular hairs and linear concolorous brown scales. *Sori* c. 1 mm in diameter; *indusium* somewhat lace-rate, bearing a few yellow glands.

Natal, Transvaal and Angola. Known from two localities in Southern Africa only: in sheltered and exposed areas in and around the Mtola Forest in the Vryheid district of Natal and on cliffs in open grassland in the Dullstroom area of Transvaal. Map 210.

Voucher: *Burrows* 3067 (BOL); *Johnstone* 304 (NU).



MAP 210.—*Woodsia angolensis*







## 2. DIDYMOCHLAENA

**Didymochlaena** Desv. in Mag. Ges. Naturf. Fr. Berl. 5: 303, t. 7 (6,6a) (1811); Engl., Pflanzenw. Afr. 2: 14 (1908); Tardieu-Blot in Mém. Inst. fr. Afr. noire 28: 153 (1953); in Fl. Madag. 5, 1: 304 (1958); Alston in F.W.T.A. edn 2, Suppl. 69 (1959); Tardieu-Blot in Fl. Camer. 3: 154 (1964); Schelpe in F.Z. Pterid.: 220 (1970); in C.F.A. Pterid.: 173 (1977). Type species: *D. sinuosa* Desv. (= *D. truncatula* (Swartz) J. Sm.).

Rhizome erect, forming a short caudex, set with large, brown, subentire rhizome-scales. Fronds tufted; stipe scaly; lamina oblong-ovate, firmly herbaceous, 2-pinnate; pinnules dimidiate-trapeziform, subsessile, articulate; veins free. Sori borne towards acroscopic margin of pinnules, broadly elliptic; indusium peltate with a narrow, laterally elongate stalk.

A monotypic pantropic genus.

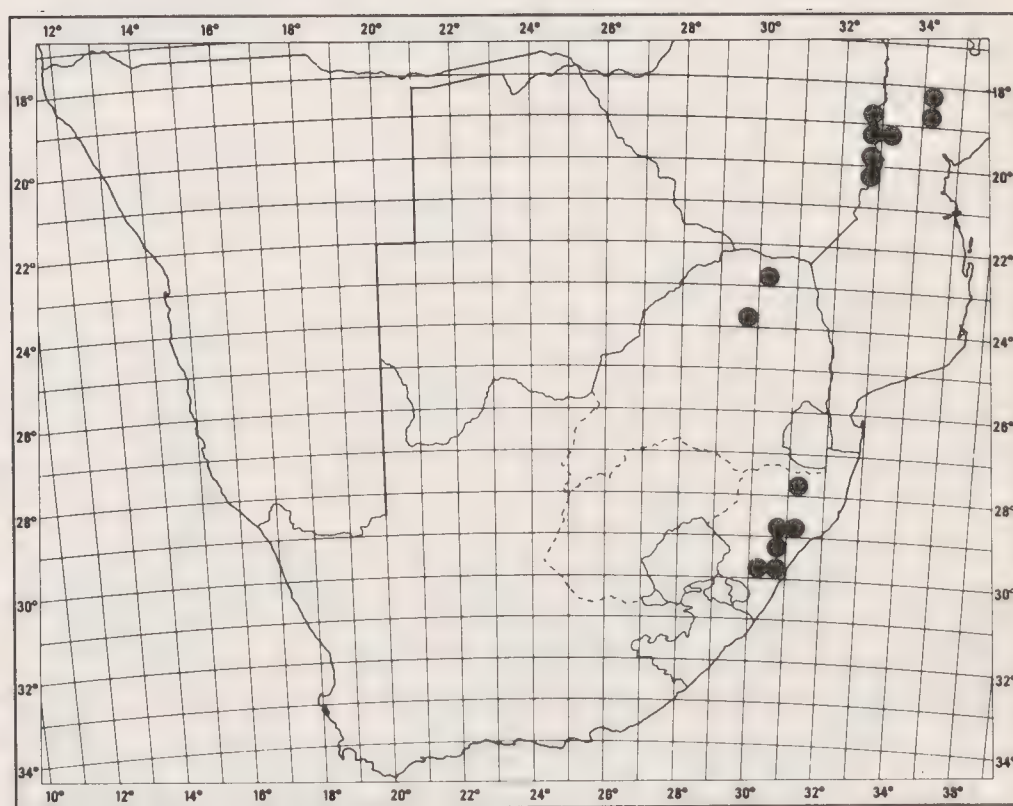
**Didymochlaena truncatula** (Swartz) J. Sm. in Hook., J. Bot. 4: 196 (1841); Sim, Ferns S. Afr. edn 2: 112, t. 24 (1915); Schelpe in F.Z. Pterid.: 220, t. 64E (1970); in C.F.A. Pterid.: 173 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 432, t. 325 (1983). Iconotype: Houttyn, Nat. Hist. 14: 209, t. 100 fig. 1 (1783)!, possibly from Java.

*Aspidium truncatulum* Swartz in J. Bot., Gött. 1800, 2: 36 (1801).

*Adiantum lunulatum* Houtt., Nat. Hist. 14: 209, t. 100 fig. 1 (1783), non Burm. (1768). *Didymochlaena lunulata* (Houtt.) Desv. in Mém. Soc. Linn., Paris 6: 282 (1827). *Nephrolepis lunulata* (Houtt.) Keys., Polypod. Cyath. Herb. Bunge 40 (1873). Type as for *Didymochlaena truncatula*.

*Didymochlaena dimidiata* Kunze in Linnaea 18: 122 (1844). Type: Natal, the great waterfall between the Omfondi and Tugela Rivers, Gueinzius s.n. (LZ, holo.†; K, iso.†; L-BOL, photo.!).

Rhizome up to 25 mm in diameter, forming a caudex up to 200 mm high and 150 mm in diameter, set with attenuate rhizome-scales up to  $20 \times 1$  mm, with a few filamentous marginal outgrowths. Fronds arching, firmly herbaceous; stipe stramineous, up to 0,5 m long, set with linear and narrowly ovate scales up to 10 mm long; lamina oblong-ovate, up to  $1 \times 0,45$  m, 2-pinnate, not reduced basally; pinnae pinatifid into up to 26 pairs of dimidiate rhombic petiolate pinnules, basisopic margin entire, thickened, acroscopic margin serrate, glabrous



MAP 211.—*Didymochlaena truncatula*

on both surfaces at maturity. Sori 1–6 per pinnule, up to  $2,5 \times 2$  mm, borne in a depression; indusium dark brown with a paler border, entire. Fig. 83: 1.

Natal, Transvaal, Zimbabwe, Mozambique, Malawi, Zaire, Angola, Burundi, Tanzania, Kenya, Uganda, Cameroun, Fernando Po, São Tomé, Madagascar and Comoro Islands; pantropical. In Southern Africa *D. truncatula* is a rare plant usually found as single specimens or in small colonies. It is almost entirely confined to moist and heavily shaded forest habitats along streambanks but has once been reported from a deep cleft in an equally heavily shaded and moist habitat. In this region it occurs between altitudes of 1 000 and 1 850 m. Map 211.

Vouchers: Enslin & Schweickerdt s.n. (NU; PRE); Fisher 945 (BOL; NH; NU; PRE).







## 3. DRYOPTERIS

**Dryopteris** Adans., Fam. Pl. 2: 20, 551 (1763); Tardieu-Blot in Mém. Inst. fr. Afr. noire 28: 148 (1953); in Fl. Madag. 5, 1: 307 (1958); Alston in F.W.T.A. edn 2, Suppl. 69 (1959); Tardieu-Blot in Fl. Camer. 3: 258 (1964); Schelpe in F.Z. Pterid.: 220 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 89 (1973); in C.F.A. Pterid.: 174 (1977). Nom. conserv. Type species: *D. filix-mas* (L.) Schott (= *Polypodium filix-mas* L.).

Rhizome erect or creeping, set with broad, concolorous, entire or subentire rhizome-scales. *Fronds* tufted; *stipe* often with broad to narrow persistent scales; *lamina* herbaceous, oblong-lanceolate to broadly deltate, 2-pinnatifid to 4-pinnate, basal pair of pinnae often developed basis-copically, ultimate segments crenate to serrate, rarely aristate-dentate; *veins* free. *Sori* circular with reniform indusia.

A cosmopolitan genus of about 150 species.

- 1a Fronds 3-dimensional with suberect pinnae set at an angle of less than 45° to rhachis ..... 2. *D. athamantica*
- 1b Fronds 2-dimensional with pinnae set at an angle of more than 45° to rhachis:
  - 2a Stipe and rhachis set with numerous patent dark brown scales ..... 1. *D. squamiseta*
  - 2b Stipe and rhachis glabrous or set with pale brown to ferruginous scales:
    - 3a Fronds dimorphic, fertile fronds lanceolate, erect, sterile fronds deltate, subprostrate ..... 4. *D. dracomontana*
    - 3b Fronds monomorphic, fertile and sterile fronds similar:
      - 4a Fronds thickly coriaceous; sori c. 2 mm in diameter ..... 5. *D. esterhuyseniae*
      - 4b Fronds herbaceous; sori c. 1–1,5 mm in diameter:
        - 5a Lamina set with scattered hair-like scales below ..... 3. *D. inaequalis*
        - 5b Lamina glabrous below ..... 6. *D. callolepis*

1. **Dryopteris squamiseta** (Hook.) Kuntze, Rev. Gen. 2: 813 (1891); Schelpe in F.Z. Pterid.: 223 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 440, t. 332 (1983). Type: Fernando Po, Clarence Peak, Mann 380 (K, holo.).

*Nephrodium squamisetum* Hook., Sp. Fil. 4: 140, t. 268 (1858). *Aspidium squamisetum* (Hook.) Kuhn, Fil. Deck. 24 (1867).

*Nephrodium buchananii* Bak. in Hook. & Bak., Syn. Fil. 498 (1874). *Lastrea buchananii* (Bak.) Bedd., Handb. Ferns Brit. Ind. 255 (1883). *Dryopteris buchananii* (Bak.) Kuntze, Rev. Gen. 2: 812 (1891); Sim, Ferns S. Afr. edn 2: 108, t. 20 (1915). Type: Natal, Buchanan s.n. (K, holo.).

Rhizome suberect, up to 7 mm in diameter, set with narrowly ovate-attenuate, brown rhizome-scales up to 9 × 1,2 mm. *Fronds* tufted, arching; *stipe* castaneous when dry, darker basally, set with patent dark brown, narrowly deltate-attenuate, subentire scales c. 4 mm long; *lamina* herbaceous, ovate-deltate, c. 550 × 380 mm, 4-pinnatifid, basal pinnae

largest and developed basis-copically; *pinnae* attenuate; *pinnules* unequally oblong-deltate, very deeply pinnatifid into oblong-rounded lobes, subentire or shallowly crenate, set below with minute hair-like and broader clathrate scales less than 1 mm long, above with scattered narrow clathrate scales; *rhachis* stramineous when dry, set with broad-based dark brown scales and hair-like multicellular scales. *Sori* borne distally on each pinnule; *indusium* brown, paler marginally, entire, c. 1 mm in diameter.

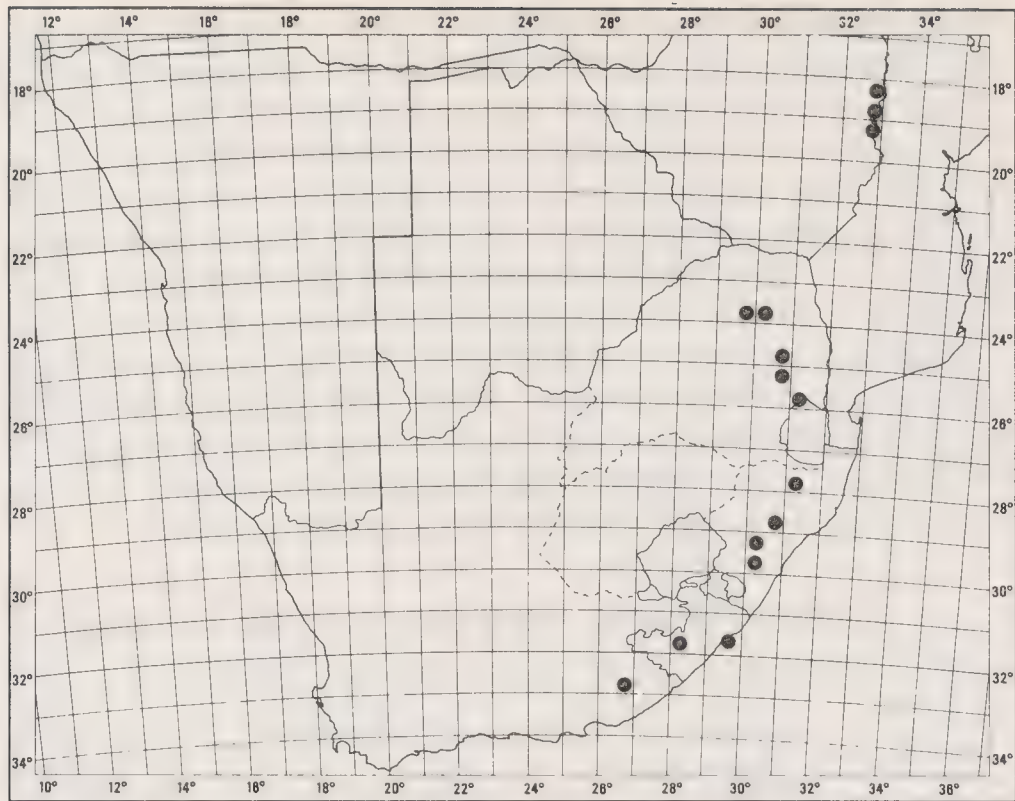
Eastern Cape Province, Transkei, Natal, Swaziland, Transvaal, Zimbabwe, Tanzania, Kenya, Sudan and Fernando Po. Also Madagascar and Mascarene Islands (Christensen, 1932) and Cameroun (Tardieu-Blot, 1953). *D. squamiseta* occurs sporadically on streambanks and marshy situations in deep shade in forest. In Natal and Transvaal it occurs at altitudes from 1 350 to 1 850 m, and in eastern Zimbabwe from 1 700 to 2 300 m elevation. Map 212.

Vouchers: Burrows 1380 (BOL; NBG); Fisher 886 (NH; NU; PRE); Schweickerdt 2432 (BOL; PRE; PRU).









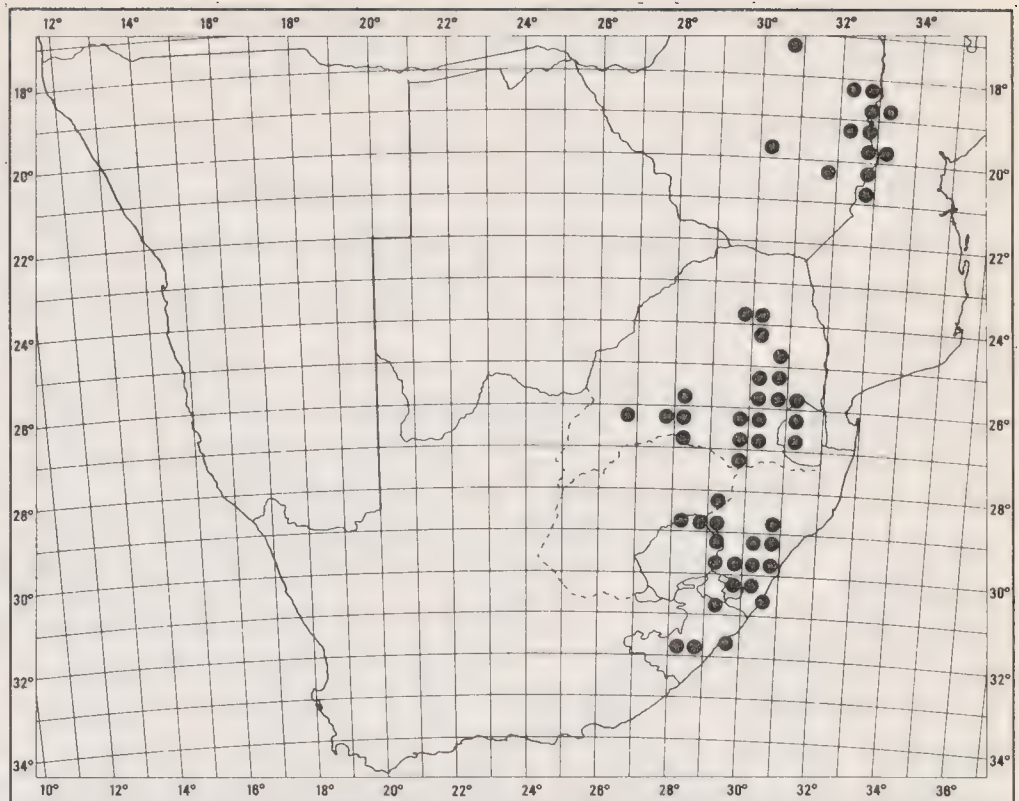
MAP 212.—*Dryopteris squamiseta*

2. *Dryopteris athamantica* (Kunze) Kuntze, Rev. Gen. 2: 812 (1891); Sim, Ferns S. Afr. edn 2: 107, t. 19 (1915); Schelpe in F.Z. Pterid.: 221 (1970); in C.F.A. Pterid.: 174 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 433, t. 326 (1983). Type: Natal, Port Natal, *Gueinzus* s.n. (LZ, holo. †).

*Aspidium athamanticum* Kunze in Linnaea 18: 123 (1844). *Lastrea athamantica* (Kunze) T. Moore in J. Bot., Lond. 5: 511 (1853). *Nephrodium athamanticum* (Kunze) Hook., Sp. Fil. 4: 125, t. 258 (1862).

*Lastrea plantii* T. Moore in J. Bot., Lond. 5: 227 (1853). Type: Natal, Mooi River, *Plant* 313 (BM, holo.!).

Rhizome shortly creeping, c. 15 mm in diameter, set with ferrugineous, linear-attenuate, irregularly lacerate rhizome-scales c. 10 mm long. *Fron*ds tufted, erect, 3-dimensional; *stipe* shorter than lamina, light brown to stramineous, darker and densely set with scales basally; *lamina* thinly coriaceous, ovate-deltate, up to 640 × 240 mm, 3-pinnatifid, basal pinnae usually largest, developed basiscopically, set below with linear-attenuate scales of different sizes, above with jointed scales c. 0,3 mm long; *pinnae* set at an angle of 45–60° to rhachis; *pinnules* narrowly and unequally deltate to oblong-acute, pinnatifid into acutely serrate-dentate ultimate segments, borne at an angle of 45° to costa; *secondary rhachises* mostly winged by lamina. *Sori* in two rows on ultimate segments; *indusium* orange, erose, c. 1 mm in diameter. Fig. 84: 2.



MAP 213.—*Dryopteris athamantica*

Eastern Cape Province, Transkei, Lesotho, Natal, Swaziland, Transvaal, Zimbabwe, Mozambique, Zambia, Angola, Zaire, Burundi, Tanzania, Uganda, Sudan, Cameroun, Nigeria, Ghana, Sierra Leone and Guinea. Usually found growing in moist depressions or around boulders in grassland, and sometimes in old antbear holes. In Natal it occurs at altitudes between 1 500 and 1 800 m, and in Zimbabwe from 1 550 and 2 000 m. Map 213.

Vouchers: *Dieterlen* 167 (NH; PRE; SAM); *Fisher* 940 (NH; NU; PRE); *Schlechter* 6556 (BM; GRA; PRE).

3. *Dryopteris inaequalis* (Schlecht.) Kuntze, Rev. Gen. 2: 813 (1891); Sim, Ferns S. Afr. edn 2: 106, t. 18 (1915); Schelpe, F.Z. Pterid.: 221 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 435, t. 327 (1983). Type: Cape of Good Hope, *Mundt & Maire* s.n. (B, lecto.!—BOL, photo.!).

*Aspidium inaequale* Schlecht., Adumbr. 23, t. 12 (1825). *Lastrea inaequalis* (Schlecht.) Presl, Tent. Pterid. 77 (1836), reimpr. in Abh. K. Böhm. Ges. Wiss., ser. 4,5: 77 (1837). *Nephrodium inaequale* (Schlecht.) Hook., Sp. Fil. 4: 125 (1862), non Schrad. (1824). *Polystichum inaequale* (Schlecht.) Keys., Polypod. Cyath. Herb. Bunge 44 (1873).

*Lastrea pentagona* T. Moore in Hook., J. Bot., Lond. 5: 227 (1853). Type: Natal, Umvoti, *Plant* 325 (K, holo.!—BOL, photo.!).

*Nephrodium pentheri* Krasser in Annln naturf. Mus. Wien 15: 5, t. 2 figs 1–5 (1900). *Dryopteris pentheri* (Krasser) C.Chr., Ind. Fil. 284 (1905). Type: Orange Free State, Van Reenens Pass, *Krook* s.n. (W, holo.!—BOL, photo.!).

*Dryopteris elongata* sensu Sim, Ferns S. Afr. edn 2: 104, t. 17 (1915). Type from Madeira and the Azores.



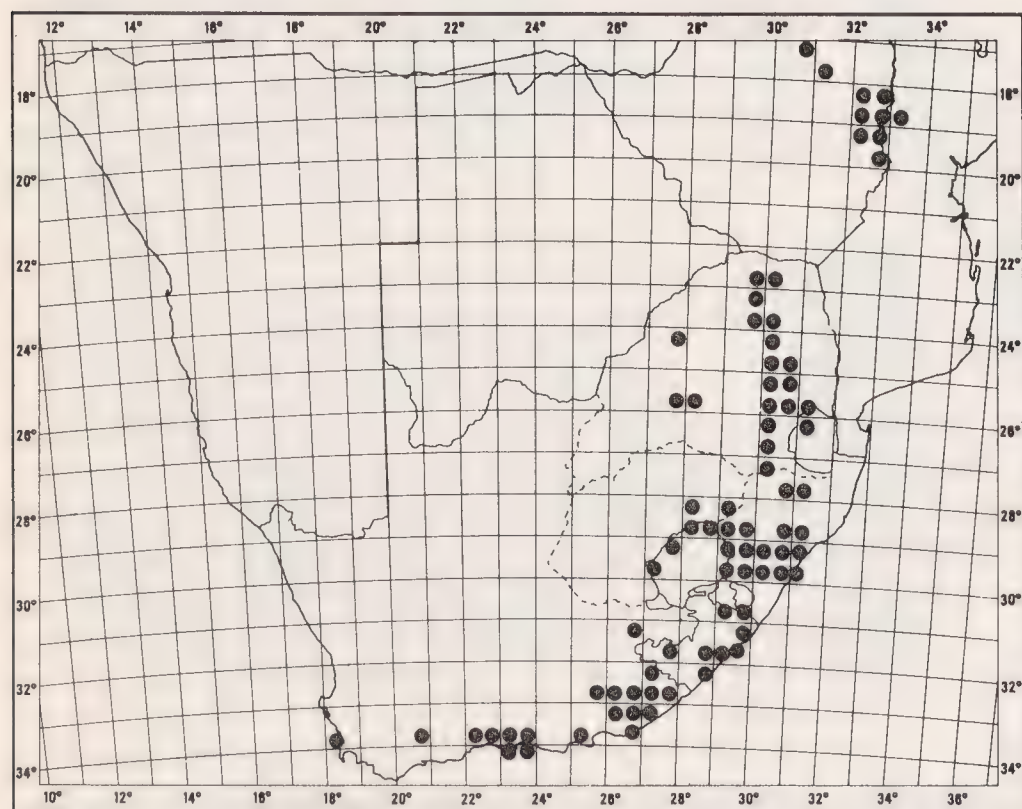
*Aspidium inaequale* var. *montanum* sensu W. B. G. Jacobsen, Ferns. Sthn Afr. 437, t. 328 (1983).

Rhizome creeping, up to 35 mm in diameter, set with lanceolate, attenuate, ferruginous rhizome-scales up to 20 mm long, with occasional denticulate or lacerate marginal outgrowths. *Fronds* arching; *stipe* stramineous, scaly, up to 0,8 m long; *lamina* thinly to firmly herbaceous, ovate to broadly deltate, up to 1 × 0,4 m, 3–4-pinnatifid, basal pinnae reduced or largest, developed basiscopically; *pinnae* overlapping or spaced, oblong to somewhat deltate or ovate-acuminate; *pinnules* oblong or somewhat deltate, pinnatifid into oblong, crenate-serrate or pinnatifid, obtuse to truncate lobes, glabrous above, set below with scattered minute, multicellular, hair-like brown scales c. 1 mm long along veins, graduating larger towards rhachis; *rhachis* stramineous to pale brown, set with pale brown scales. *Indusium* membranous to somewhat carnose, subentire, c. 1 mm in diameter.

*D. inaequalis* is distributed from Table Mountain in south-western Cape Province, through Transkei, Lesotho, Natal and Orange Free State to Swaziland, Transvaal, Zimbabwe and Mozambique, as well as tropical Africa. It is found in moist, shaded habitats, usually in forest. Map 214.

Vouchers: *Dieterlen* 283 (BOL; PRE); *Esterhuysen* 26035 (BOL; NBG; PRE); *Roux* 112 (BOL; NBG); 558 (BOL; NBG); *Schelpe* 6010 (BOL; PRE).

It has long been realised (Sim, 1915; Jacobsen 1978, 1983) that *D. inaequalis* is very probably a species complex consisting of two or more taxa which are at present inseparable due to a continuum of morphological variation. The most obvious identifiable extremes in the range of frond variation are the forms with reduced basal pinnae (*D. inaequalis* sensu Sim) and the forms with enlarged basal pinnae (*D. elongata* sensu Sim). The former is distributed from



MAP 214.—*Dryopteris inaequalis*

south-western Cape Province to Natal, while the latter occurs throughout the range of the complex and could possibly constitute more than one taxon. Unpublished cytological work carried out on the complex in Southern Africa (Gibby, unpubl.) has indicated that chromosome counts are unlikely to be of any assistance in unravelling the *D. inaequalis* complex. Unpublished scanning electron microscopy work carried out on the spores of various elements in the complex indicates disjunctions which have yet to be convincingly associated with morphology. Until such time as the different elements can be satisfactorily separated on characters other than frond shape, the complex is treated here as *Dryopteris inaequalis* (Schlecht.) Kuntze sens. lat.

4. *Dryopteris dracomontana* Schelpe & N.C. Anthony in Contr. Bolus Herb. 10: 147 (1982). Type: Natal, Drakensberg, Giant's Castle, Langalibalele's Pass, Winter 4 (BOL, holo.!: K!).

*Aspidium inaequale* var. *montanum* Kunze in Linnaea 10: 549 (1836). *Dryopteris pentheri* var. *montana* (Kunze) Alston in Bolm Soc. broteriana, sér. 2, 30: 14 (1956). Syn-types: Cape Province, Sneeuwbergen and Witbergen, Drège s.n. (LZ†; BM, isosyn.!).

Rhizome creeping, c. 10 mm in diameter, set with brown to ferruginous, narrowly lanceolate, attenuate, somewhat dentate or fimbriate rhizome-scales up to 17 mm long. *Fronds* dimorphic: sterile fronds erect, somewhat deltate, shorter and more compact than fertile fronds, fertile fronds prostrate, lanceolate, up to 300 × 80 mm, pinnules usually spaced; *stipe* shorter than lamina, darker basally, scaly; *lamina* thinly carnose-coriaceous, 3-pinnatifid, basal pinnae largest or hardly reduced, a little developed at basiscopic margin; *pinnae* oblong, acute, pinnules shallowly to deeply pinnatifid, lobes rounded, bluntly crenate-dentate, glabrous above, with scattered hairs c. 0,5 mm long below; *rhachis* and *secondary rhachises* set with pale brown, subentire, attenuate scales of different sizes. *Indusium* membranous, somewhat erose, c. 1 mm in diameter.

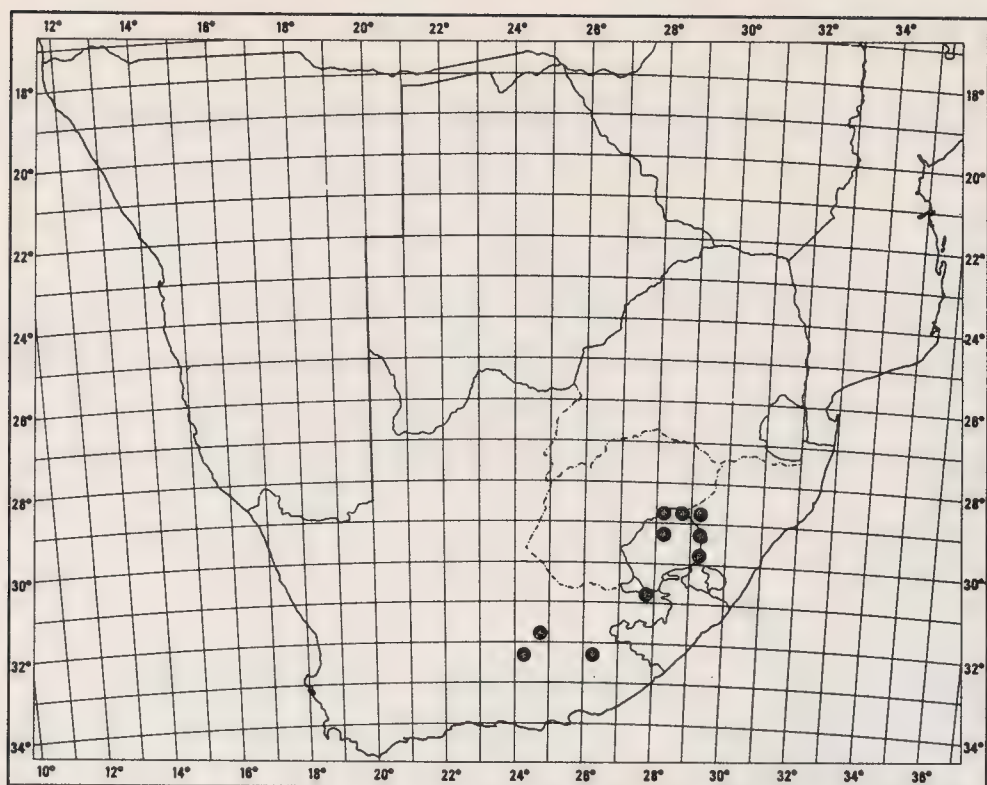
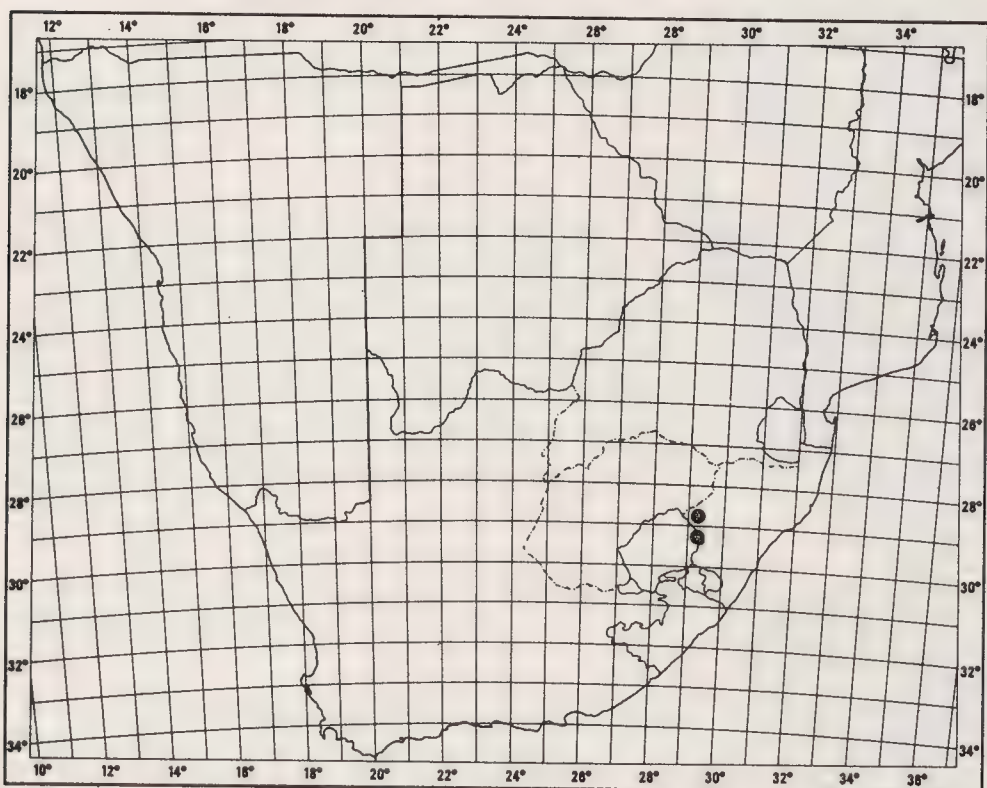
Cape Province, Natal, Lesotho and Orange Free State. On damp slopes at high altitudes on the Drakensberg, 2 000–3 000 m. Map 215.

Vouchers: *Davis* 216 (NU); *Dyke* 5486 (NBG); *Esterhuysen* 20284 (BOL); *Galpin* 6937 (BOL); 6938 (BOL).

5. *Dryopteris esterhuyseniae* Schelpe & N.C. Anthony in Contr. Bolus Herb. 10: 148 (1982). Type: Natal, Drakensberg, Mnweni area below Rokeries, 2 300–2 700 m, *Esterhuysen* 21663 (BOL, holo.!: BM!; NBG!).

Rhizome creeping, up to 20 mm in diameter, set with lanceolate, attenuate, irregularly dentate rhizome-scales c. 7 mm long. *Fronds*



MAP 215.—*Dryopteris dracomontana*MAP 216.—*Dryopteris esterhuyseniae*

erect to arching; *stipe* c. half lamina length, stramineous to reddish when dry, darker basally, scaly; *lamina* thickly carnose-coriaceous, ovate-lanceolate or somewhat deltate, c. 300 × 100 mm, 3-pinnatifid, basal pinnae hardly reduced, only slightly developed basiscopically; *pinnae* oblong-acute; *pinnules* unequally deltate, pinnatifid into rounded, usually overlapping, irregularly crenate-dentate lobes, upper surface glabrous, lower surface set with occasional multicellular hair-like scales c. 0,5 mm long; *rhachis* and *secondary rhachises* set with irregularly-sized scales. *Indusium* thickly membranous, ferrugineous, subentire to erose, c. 2 mm in diameter, often with central processes.

Confined to the Natal Drakensberg at high altitudes. Map 216.

Vouchers: *Davis* 178 (NU); *Esterhuysen* 26040 (BOL; PRE).

6. *Dryopteris callolepis* C. Chr. in Notizbl. bot. Gart. Mus. Berl. 9: 177 (1924); Schelpe in F.Z. Pterid.: 223 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 439, t. 330 (1983). Type: Kenya, Aberdare Mountains, R. E. & T. C. E. Fries 2554 (BM, holo.!).

Rhizome shortly creeping, c. 8 mm in diameter, set with ferrugineous, lanceolate-attenuate rhizome-scales c. 9 × 1,5 mm. *Fronde* tufted, arching; *stipe* shorter than lamina, stramineous, darkened basally, set with reddish, concolorous or faintly striped, ovate-attenuate scales; *lamina* herbaceous, ovate-deltate, up to c. 700 × 340 mm, 3-pinnatifid, basal pinnae usually slightly reduced, conspicuously developed basiscopically; *pinnae* narrowly and unequally deltate; *pinnules* narrowly deltate or oblong, deeply pinnatifid into oblong, deeply lacerate-dentate lobes, upper surface set with occasional hair-like scales, lower surface set with irregularly shaped, usually narrow tapering, clathrate scales, often the scale or scale tip consisting of a single row of cells; *secondary rhachises* narrowly winged by lamina. *Sori* borne within ultimate segments; *indusium* orange, c. 1–1,5 mm in diameter. Fig. 85.

South-western and southern Cape Province, Zimbabwe, Zaire, Tanzania, Uganda and Kenya. On rocky mountain slopes, in shady gullies and below cliffs, c. 1 300–2 300 m in Cape Province. Map 217.

Vouchers: *Esterhuysen* 26795 (B; BM; BOL; MO; PRE); 27613 (BM; BOL; MO; NBG).

*D. callolepis* superficially resembles *D. kilemensis* (Kuhn) Kuntze which is distributed from Zimbabwe northwards into tropical East Africa. That species can be distinguished by its broadly deltate lamina and by the broadly ovate scales on the costae.

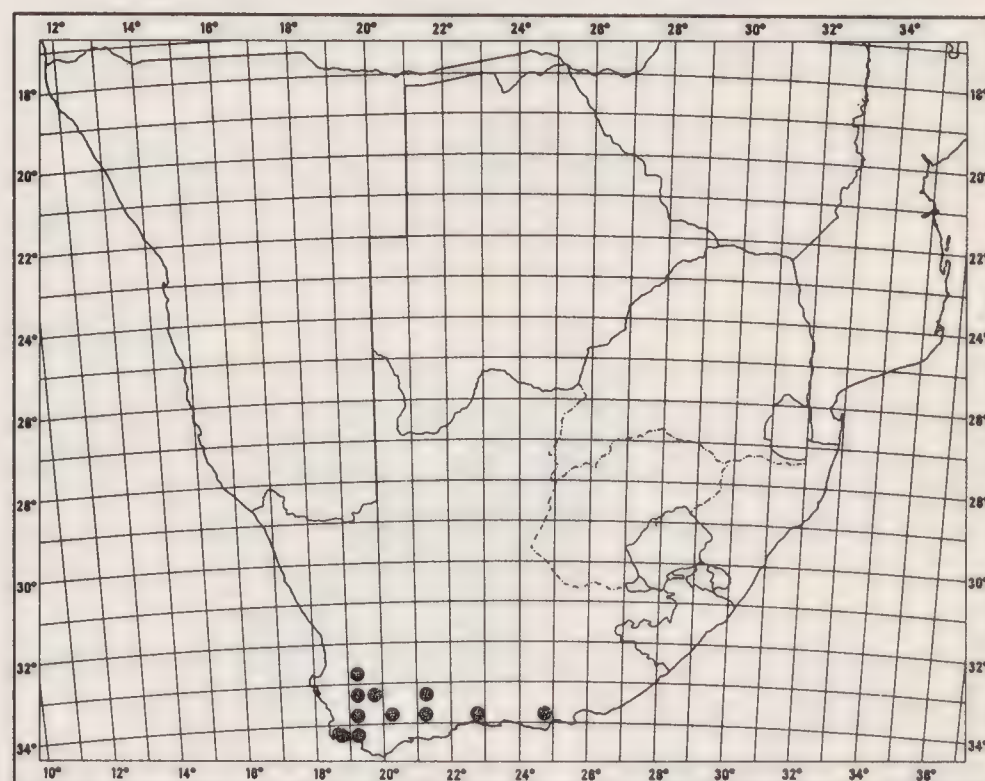
MAP 217.—*Dryopteris callolepis*





FIG. 85.—1, *Dryopteris callolepis*, frond,  $\times 0,6$ ; 1a, detail of lower surface of pinnule,  $\times 1,8$  (Esterhuysen 27033).



## 4. CYRTOMIUM

**Cyrtomium** Presl, Tent. Pterid. 86, t. 2 fig. 26 (1836). Type species: *C. falcatum* (L.f.) Presl (= *Polypodium falcatum* L.f.).

Rhizome short, ascending to erect, densely scaly with broad, entire to lacerate rhizome-scales. *Fronds* firmly herbaceous, lamina imparipinnate or with pinnatifid apex; *pinnae* almost always acuminate, often falcate and auricled on acroscopic side basally, usually sharply dentate; *veins* anastomosing. *Sori* dorsal or sometimes terminal on veins; *indusium* peltate, persistent or caducous or apparently absent. *Spores* monolete, tuberculate.

A temperate and tropical genus of about 25 species, until recently treated as *Phanerophlebia* Presl (Tryon & Tryon, 1982).

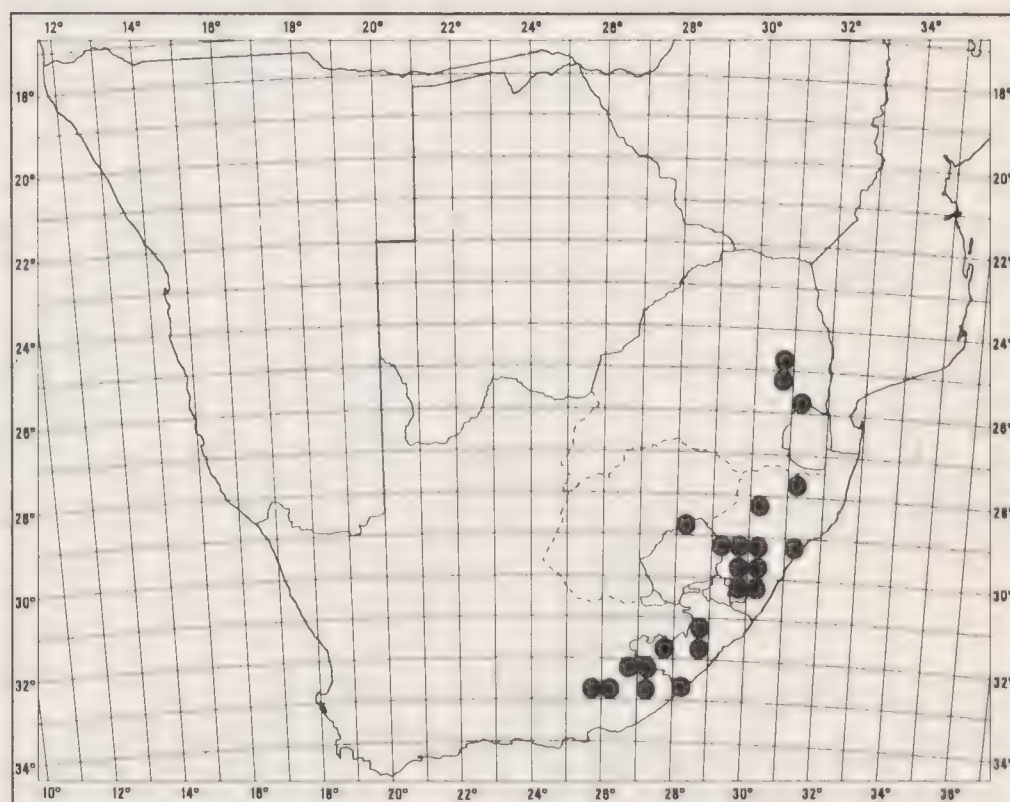
**Cyrtomium caryotideum** (Wall. ex Hook. & Grev.) Presl, Tent. Pterid. 86, t. 2 fig. 26 (1836). Type: India (?Nepal), Wallich s.n. (K, holo.).

Var. **micropterum** (Kunze) C. Chr., Ind. Fil., Suppl. 3: 66 (1934), as *micropteron*. ?Iconotype: Presl, Tent. Pterid. t. 2 fig. 26 (1836)!

*Aspidium anomophyllum* forma *micropteris* Kunze in Linnaea 24: 278 (1851), as *microptera*. *Cyrtomium falcatum* var. *micropteris* (Kunze) C. Chr. in Am. Fern J. 20: 52 (1930). *Cyrtomium micropterum* (Kunze) Ching, Icon. Fil. Sin. 3: t. 127 (1935). *Phanerophlebia caryotideum* var. *micropteris* (Kunze) Tardieu-Blot in Fl. Madag. 5, 1: 326 (1958); W. B. G. Jacobsen, Ferns Sthn Afr. 455, t. 344 (1983).

*Cyrtomium falcatum* sensu Sim, Ferns S. Afr. edn 2: 121, t. 32 (1915).

Rhizome set with appressed, ovate-lanceolate, very dark brown rhizome-scales c. 8 mm long with fimbriate margins. *Fronds* tufted, broadly ovate, pinnate, with a bilobed or sometimes trilobed terminal segment; *stipe* light brown to stramineous, set with narrow, somewhat fimbriate scales and in lower half to two-thirds with dark brown, ovate or ovate-lanceolate scales sometimes with a darker central stripe; *pinnae* ovate-acuminate, base cuneate-truncate, broader acroscopically, margin serrate, lower surface set with occasional hair-like



MAP 218.—*Cyrtomium caryotideum* var *micropterum*

scales, especially at base of costa; *rhachis* stramineous, set with scales of different sizes. *Sori* 1–1.5 mm in diameter, with paraphyses; *indusia* round, pale, margin erose, caducous. Fig. 83: 3.

Eastern Cape Province, Transkei, Lesotho, Natal, Transvaal, Tanzania, Kenya, Uganda, Ethiopia, Madagascar. Also Cameroun (Tardieu-Blot, 1964). In shade on forest floors and streambanks, c. 1 200–1 500 m. Map 218.

Vouchers: Dieterlen 826 (PRE; SAM); Schelpe 6560 (B; BOL; C; K; M; MO; P; PR; PRE; S); Schlechter 6636 (GRA; K; PRE); Smook 567 (BOL; NU).

## 5. POLYSTICHUM

**Polystichum** Roth, Tent. Fl. Germ. 3: 31, 69 (1799); Engl., Pflanzenw. Afr. 2: 14 (1908); Tardieu-Blot in Mém. Inst. fr. Afr. noire 28: 151 (1953); in Fl. Madag. 5, 1: 318 (1958); Alston in F.W.T.A. edn 2, Suppl. 70 (1959); Tardieu-Blot in Fl. Camer. 3: 256 (1964); Schelpe in F.Z. Pterid.: 226 (1970). Type species: *P. lonchitis* (L.) Roth (= *Polypodium lonchitis* L.).

Rhizome erect to creeping, densely set with entire to variously lacerate pale to very dark brown rhizome-scales of differing shapes and sizes. *Fronds* tufted; *stipes* with large, persistent, brown to black scales basally; *lamina* narrowly elliptic to oblong-lanceolate, herbaceous to coriaceous, pinnate to 4-pinnatifid, lower pinnae not basiscopically developed, ultimate segments crenate to aristate-dentate; *veins* free. *Sori* circular with peltate indusium, rarely exindusiate.







A cosmopolitan, mainly temperate, genus of over 200 species.

- 1a Lamina pinnate..... 1. *P. macleae*
- 1b Lamina 2-pinnate or more divided:
  - 2a Rhachis scales suffused with pigment, appearing black..... 4. *P. luctuosum*
  - 2b Rhachis scales pale brown or ferrugineous:
    - 3a Rhizome erect; basal basiscopic arista of each pinnule folded over upper surface of lamina:
      - 4a Fronds narrowly ovate-lanceolate, thinly herbaceous, stipe and rhachis set with numerous ovate scales, aristae c. 1 mm long..... 7. *P. alticola*
      - 4b Fronds ovate-truncate, herbaceous, stipe and rhachis not set with numerous ovate scales, aristae c. 0,5 mm long..... 5. *P. transvaalense*
    - 3b Rhizome creeping; all aristae on each pinnule directed away from lamina:
      - 5a Lamina thickly coriaceous; indusia c. 1–2 mm in diameter, usually with central processes, nitid ..... 8. *P. dracomontanum*
      - 5b Lamina thinly coriaceous or herbaceous; indusium absent or c. 1 mm in diameter, usually without central processes, matt:
        - 6a Each pinnule subtended below by an ovate-attenuate bullate scale, rhachis and lamina scales pale brown:
          - 7a Indusium evanescent ..... 2. *P. transkeiense*
          - 7b Indusium persistent..... 3. *P. pungens*
        - 6b Pinnules not subtended by ovate-attenuate bullate scales, rhachis and lamina scales ferrugineous ..... 6. *P. monticola*

1. ***Polystichum macleae* (Bak.) Diels** in Pflanzenfam. 1, 4: 190 (1899), as *macleanii*; Sim, Ferns S. Afr. edn 2: 120, t. 31 (1915); W. B. G. Jacobsen, Ferns Sthn Afr. 443, t. 334 (1983). Type: Transvaal, Drakensberg, near Pilgrim's Rest Gold Fields, *McLea* 34 sub *Bolus* 3030 (K, lecto.!.; BOL.!.; SAM!).

*Aspidium macleae* Bak. in Hook., Ic. Pl. t. 1654 (1886), as *macleaii*.

Rhizome creeping. *Fronds* arching; *stipe* pale brown to stramineous, darker basally, set with scales more numerous basally; *lamina* thinly coriaceous, broadly lanceolate, pinnate, the basal pinnae only slightly reduced, rarely 2-pinnate; *pinnae* broadly linear, acuminate, up to 170 × 25 mm, developed acroscopically at base (this lobe sometimes completely separate in lower pinnae, up to 28 mm long), adnate acroscopically or shortly petiolate, outline of base a right angle, margin serrate-dentate, lower surface set with somewhat fimbriate, pale to ferrugineous scales, especially along costa, upper surface set with occasional hair-like scales; *rhachis* stramineous, set with ferrugineous, linear attenuate scales with very fimbriate bases; *costae* sulcate ventrally. *Sori* c. 1,5 mm in diameter; *indusium* brown, erose, c. 0,4 mm in diameter. Fig. 86.

Endemic to Transvaal and Swaziland. In shade of forest undergrowth or around exposed boulder bases and on streambanks, c. 1 800 m altitude. Map 219.

Vouchers: *Schelppe* 1641 (BM; BOL; NH; NU; K); *Schütte* 4 (BM; BOL); *Schweickerdt* 4305 (BOL; PRE).

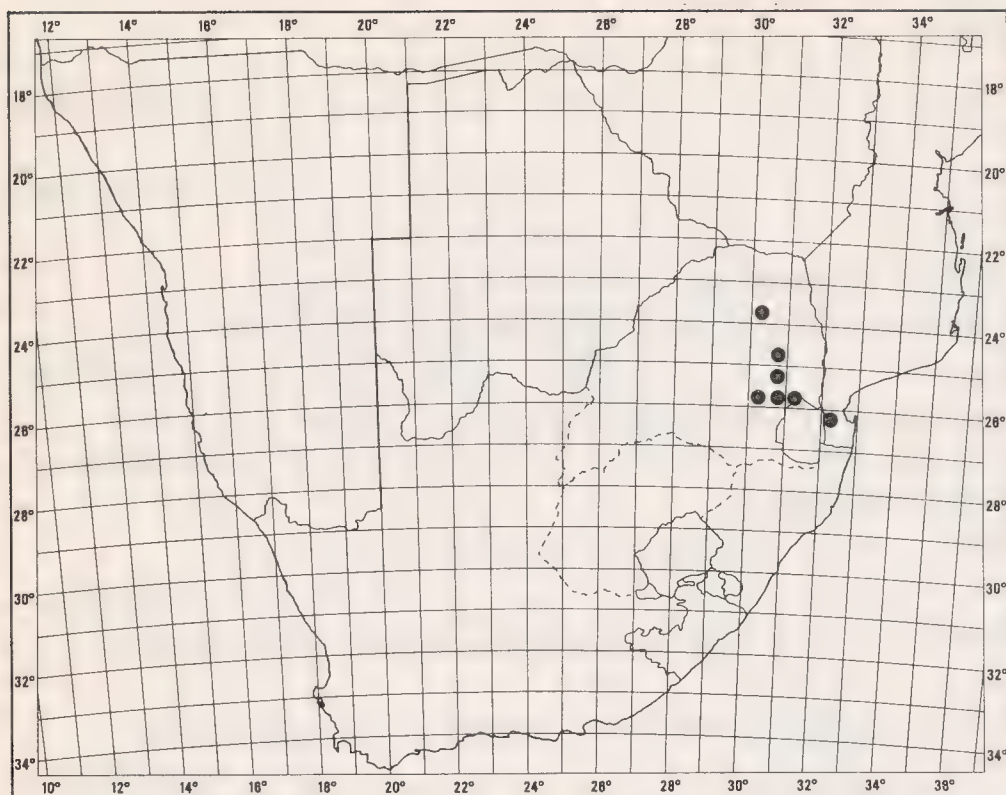
2. ***Polystichum transkeiense* W. B. G. Jacobsen** in Jl S. Afr. Bot. 44: 169 (1978); Ferns Sthn Afr. 445, t. 337 (1983). Type: Transkei, Port St Johns, *Jacobsen* 4301 (PRE, holo.!.–BOL, photo.!).

Rhizome long-creeping, c. 5 mm in diameter, set with subulate-acuminate, minutely lacerate-denticulate, brown rhizome-scales c. 15 × 3 mm. *Fronds* closely to widely spaced, arching; *stipe* flexuose, shorter or longer than *lamina*, subglabrous at maturity except for scales basally; *lamina* herbaceous, ovate, up to 680 × 300 mm, 3–4-pinnatifid, basal pinnae not or slightly reduced; *pinnae* ovate-oblong acuminate; *pinnules* not falcate, aristate or elongate and pinnatifid, glabrous ventrally, lower surface set with minute, bullate, attenuate scales and each pinnule subtended by a larger bullate scale; *venation* apparent; *rhachis* and *secondary rhachises* brown to stramineous, set with ovate-attenuate bullate scales, more numerous at junctions with pinnae and pinnules. *Sori* c. 1 mm in diameter; *indusia* minute, evanescent at an early stage.

Eastern Cape Province, Transkei, Natal and Swaziland. Shaded forest floors and ravines, from sea level in Transkei to c. 1 500 m in Swaziland. Map 220.

Vouchers: *McLoughlin* 788 (BOL; PRE); *Schelppe* 6163 (BOL); 6169 (BOL); *Strey* 8869 (NU; PRE); *Taylor* 5227 (NBG; PRE; STE); *Van Jaarsveld & Jacobs* 5851 (BOL; NBG; PRE).



MAP 219.—*Polystichum macleae*

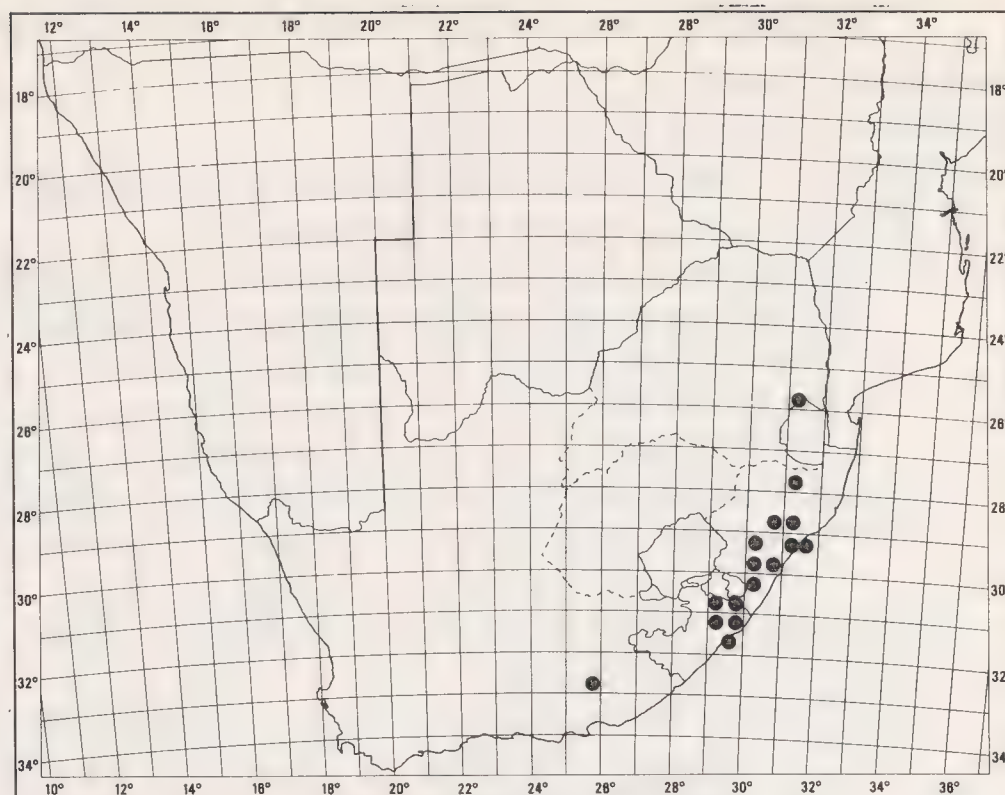
3. *Polystichum pungens* (Kaulf.) Presl, Tent. Pterid. 83 (1836). Type: Cape Province, Cape Peninsula, *Chamisso* s.n. (LE, holo.—BOL, photo.!).

*Aspidium pungens* Kaulf., Enum. Fil. 242 (1824). *Dryopteris pungens* (Kaulf.) Kuntze, Rev. Gen. 2: 813 (1891).

*Polystichum aculeatum* sensu Sim, Ferns S. Afr. edn 2: 115, t. 26 (1915).

*Polystichum lucidum* sensu Schelpe in Jl S. Afr. Bot. 35: 1 (1969); W. B. G. Jacobsen, Ferns Sthn Afr. 448, t. 339 (1983).

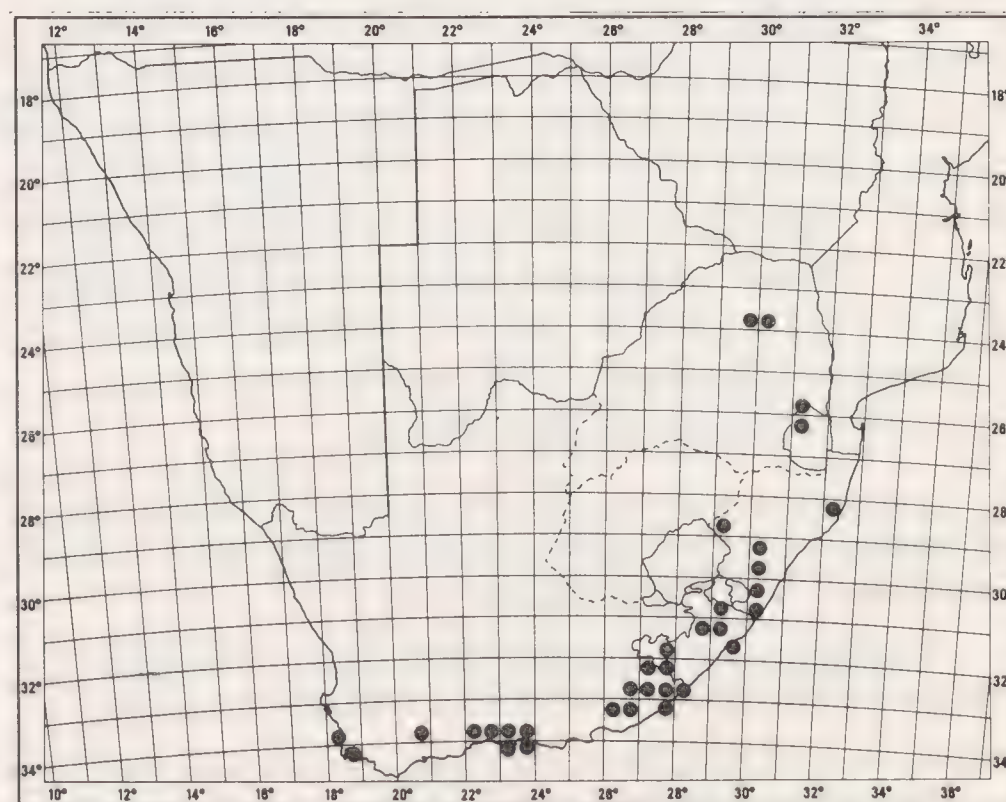
Rhizome creeping, c. 8 mm in diameter, set with lanceolate, attenuate, denticulate, ferruginous rhizome-scales c.  $10 \times 1.5$  mm. *Fronds* tufted or closely spaced, arching; *stipe* somewhat flexuose, shorter or longer than lamina, subglabrous at maturity except for scales basally; *lamina* herbaceous, broadly ovate, c.  $400 \times 260$  mm, basal pinnae somewhat reduced; *pinnae* oblong-acute, basal acroscopic pinnule largest; *pinnules* not falcate, 3- or 5-serrate, aristae c. 0.5 mm long, or pinnules elongate and pinnatifid, upper surface glabrous, lower surface set with pale brown, hair-like or bullate, lacerate scales, graduating larger towards the bullate attenuate scale subtending each pinnule; *venation* apparent; *rhachis* and *secondary rhachises* set with ovate-attenuate, lacerate, bullate, brown scales. *Sori* c. 1 mm in diameter; *indusium* membranous, sometimes thickened, entire to erose, c. 1 mm in diameter.

MAP 220.—*Polystichum transkeiense*

Cape Province, Transkei and Natal; rare in Swaziland and Transvaal. On shaded forest floors and ravines, c. 500 to 1 000 m altitude. Map 221.

Vouchers: *Braithwaite* 245 (BOL); *Esterhuysen* 26564 (BOL); 26674 (BOL); 27060 (BOL); *Schelpe* 7961 (BOL).

The type of *Asplenium lucidum* is interpreted by Morton (Photographs of Fern Specimens distributed by the U.S. National Museum no. 3865) as *Asplenium adiantum-nigrum*: 'There are two specimens in Geneva both collected by Burmann and both labelled *A. lucidum*. 'This one ..' (a photograph of *Asplenium adiantum-nigrum*) '...agrees with the description best ..' The combination *Polystichum lucidum* accepted by Becherer has, however, continued up to the present day applied to the forest habitat *Polystichum* found in the Cape Province. The other available name: *Polystichum pungens*, was applied to the high altitude rocky habitat *Polystichum*. An examination of the type of *Aspidium pungens* has revealed that the name applies to the forest fern. This has resulted in a change of application of the epithet 'pungens' and a new name for the rocky-habitat, ferruginous-scaled species. Photographs of the relevant type specimens are lodged in the Bolus Herbarium.

MAP 221.—*Polystichum pungens*



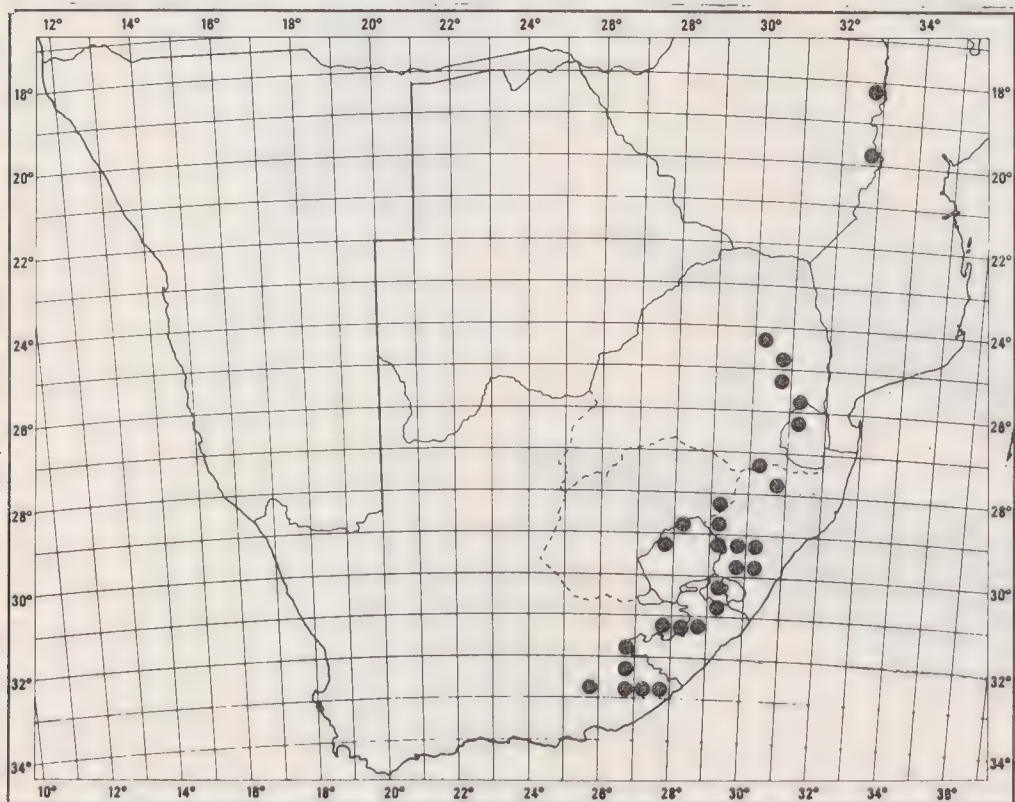
4. *Polystichum luctuosum* (Kunze) T. Moore, Ind. Fil. 95 (1858); Sim, Ferns S. Afr. edn 2: 117, t. 28 (1915); Schelpe in F.Z. Pterid.: 228, t. 64C (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 444, t. 335 (1983). Syntypes: Cape Province, Katriviersberg, *Ecklon* s.n.; at the source of the Katrivier near Philipstown, *Ecklon* s.n. (LZ†).

*Aspidium luctuosum* Kunze in Linnaea 10: 548 (1836).

Rhizome erect to suberect, c. 7 mm in diameter, set with lanceolate, acuminate, subentire, dark brown rhizome-scales c.  $10 \times 2,5$  mm, the surface near the apices with hair-like protrusions. *Fronds* tufted, arching; *stipe* pale brown, set with very narrow, almost black scales, broader basally and denticulate, becoming subglabrous with age; *lamina* firmly herbaceous, ovate-attenuate, truncate, c.  $380 \times 115$  mm, 2-pinnatifid, basal pinnae not or slightly reduced; *pinnae* curved, narrowly ovate-attenuate, basal acroscopic pinnule largest, pinnatifid; *pinnules* otherwise usually simple, crowded, lunate, aristae less than 0,5 mm long, subequal, mostly single, upper surface subglabrous, lower surface set with multicellular hair-like scales up to 1 mm long; *rhachis* set with thick narrow scales, fimbriate basally, dark brown to almost black, c. 5 mm long. *Indusium* ferrugineous with an atrocastaneous centre and pale undulate margins, subentire, c. 1 mm in diameter. Fig. 87.

Eastern Cape Province, Transkei, Natal, Lesotho, Swaziland, Transvaal, Zimbabwe and Madagascar. The species *P. tsussimense* J. Sm. in Japan is thought to be conspecific with *P. luctuosum*. In shady kloofs amongst boulders and on forest floors, c. 1 165 to 2 000 m altitude. Map 222.

Vouchers: Burrows 1342 (BOL); Compton 25822 (NBG; PRE); Edwards 2685 (NU; PRE); Gibbs Russell 3832 (PRE); Moll 905 (BOL; NU; PRE).



MAP 222.—*Polystichum luctuosum*

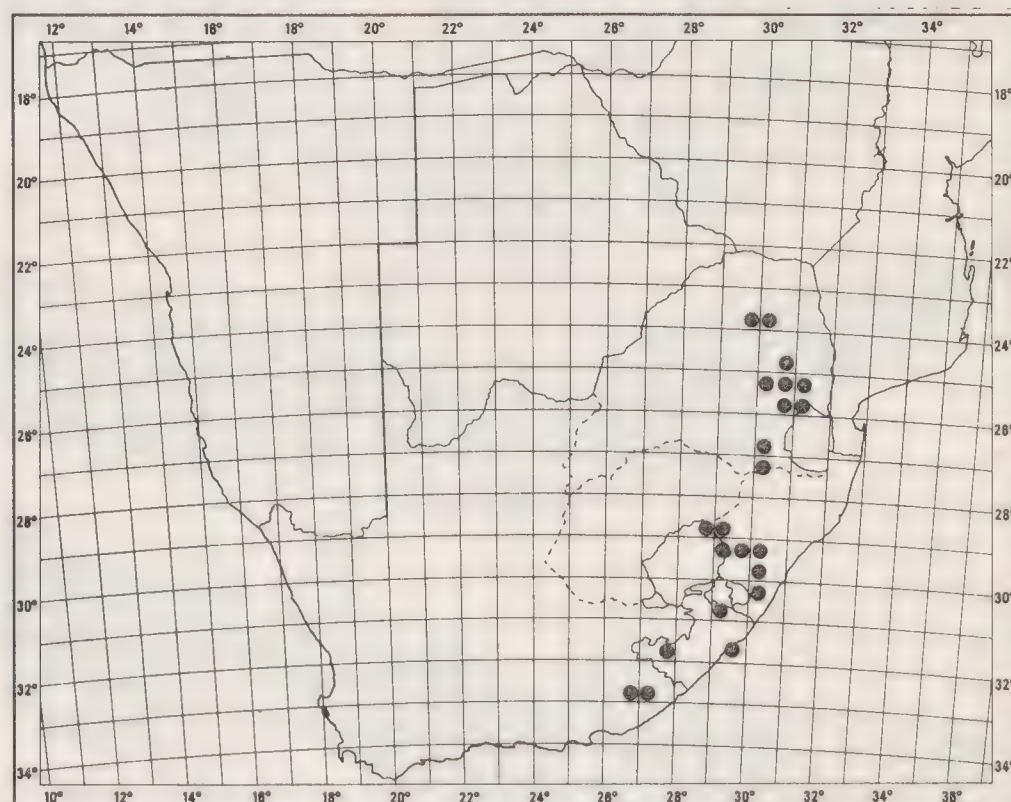
5. *Polystichum transvaalense* N.C. Anthony in Contr. Bolus Herb. 10: 146 (1982). Type: Transvaal, Pietersburg, Woodbush Forest Reserve, *Bredenkamp & Van Vuuren* 450 (BOL, holo.!, NBG!; PRE!).

*Polystichum setiferum* var. *fuscopaleaceum* sensu Schelpe, F.Z. Pterid.: 226, t. 64B (1970); sensu W. B. G. Jacobsen, Ferns Sthn Afr. 447, t. 338 (1983).

Rhizome erect, c. 7 mm in diameter, set with somewhat ferrugineous, linear-attenuate, irregularly fimbriate-dentate rhizome-scales c.  $12 \times 1$  mm. *Fronds* arching, forming a shuttlecock-shaped plant; *stipe* shorter than lamina, lower half set with ovate-attenuate, minutely lacerate-fimbriate, brown to castaneous, often centrally darkened and thickened scales c. 15 mm long; *lamina* herbaceous, narrowly ovate-attenuate, up to  $650 \times 300$  mm, mostly 2-pinnate, truncate basally; *pinnae* falcate attenuate; *pinnules* about twice as long as broad, auriculate, usually overlapping, aristae 0,5 mm long, first basisopic arista of each pinnule folded over upper surface, upper surface subglabrous, lower surface set with very narrowly linear twisted pale scales c. 1 mm long; *venation* apparent; *rhachis* and *secondary rhachises* set with narrow, very lacerate-fimbriate-based, ferrugineous, matted and appressed scales. *Indusium* fimbriate-erose, pale brown to ferrugineous, c. 1 mm in diameter.

Eastern Cape Province, Transkei, Natal, Orange Free State and Transvaal, as well as Zimbabwe and possibly further into tropical East Africa. Along streambanks in forest, c. 1 600 m altitude. Map 223.

Vouchers: McLoughlin 95 (PRE); Phelan 398 (NU); Pott 4848 (BOL; PRE); Roux 937 (NBG); Van Jaarsveld 6093A (BOL; NGB).



MAP 223.—*Polystichum transvaalense*







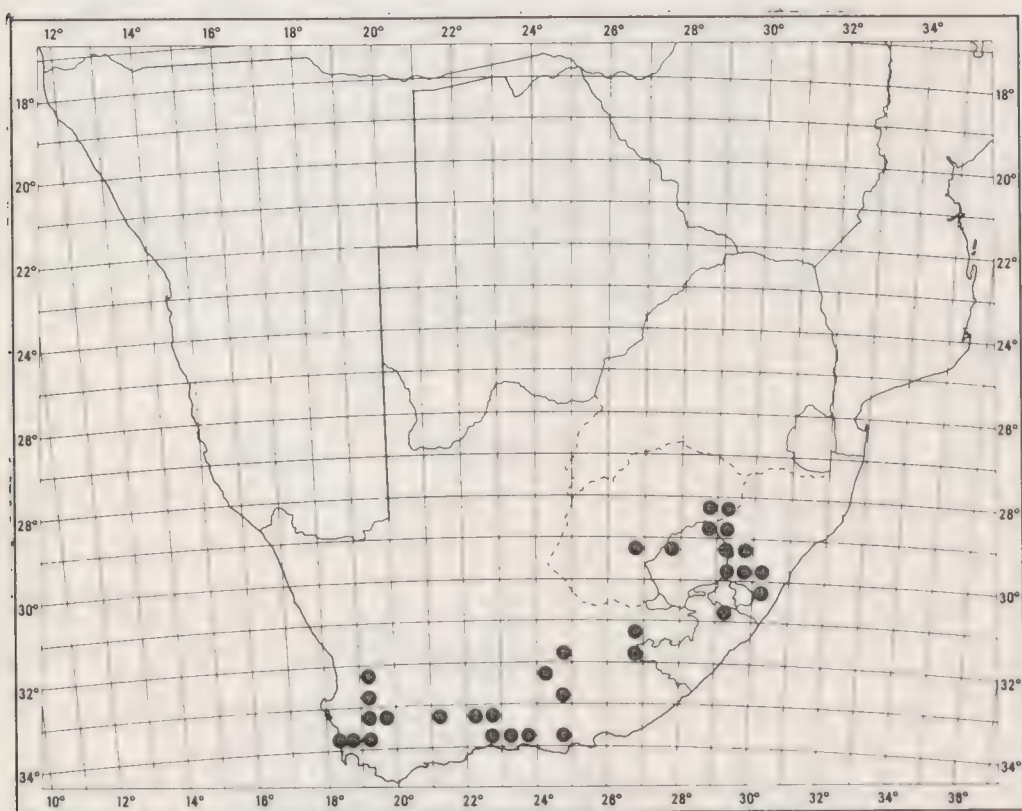
6. *Polystichum monticola* N.C. Anthony & Schelpe in Bothalia 15:554 (1985). Type: Cape Province, Cape Peninsula, Devil's Peak, Dark Gorge, *Esterhuysen* 26685 (BOL, holo.!; B!; C!; CHR!; G!; GH!; K!; M!; MO!; NBG!; NU!; P!; PR!; PRE!; S!; STE!).

*Polystichum pungens* sensu Sim, Ferns S. Afr. edn 2: 116, t. 27 (1915).

Rhizome creeping, c. 15 mm in diameter, with persistent stipe bases and set with lanceolate, ferrugineous, concolorous or castaneous-striped, shortly lacinate rhizome-scales c. 10 mm long. *Fron*ds tufted at apex of rhizome, arching; *stipe* pale brown, thickly set with brown or more usually ferrugineous, broad and narrow scales, becoming subglabrous with age except for a tuft of scales basally; *lamina* herbaceous to thinly coriaceous, ovate-truncate, c. 350 × 140 mm, 2-pinnate to 3-pinnatifid, basal pinnae only slightly reduced; *pinnae* very narrowly ovate, attenuate; *pinnules* appearing lunate, aristae not prominent, upper surface glabrous, lower surface set with occasional hair-like scales; *venation* somewhat apparent; *rhachis* and *secondary rhachises* set with numerous lacinate-based, ferrugineous scales. *Sori* c. 1–1.5 mm in diameter; *indusium* membranous, erose, c. 1 mm in diameter.

Cape Province, Transkei, Lesotho, Natal and Orange Free State. On rocky mountain slopes in shaded habitats, c. 1–2 000 m altitude. Map 224.

Vouchers: *Dieterlen* 695 (PRE; SAM; STE); *Esterhuysen* 26698 (B; BOL; C; G; GH; K; M; MO; NBG; NU; PR; PRE; STE); 35645 (B; BOL; C; G; GH; K; M; MO; NBG; NU; P; PRE; S; STE); *Hilliard & Burt* 11795 (NU; PRE); *Schlechter* 6932 (NBG; PRE).



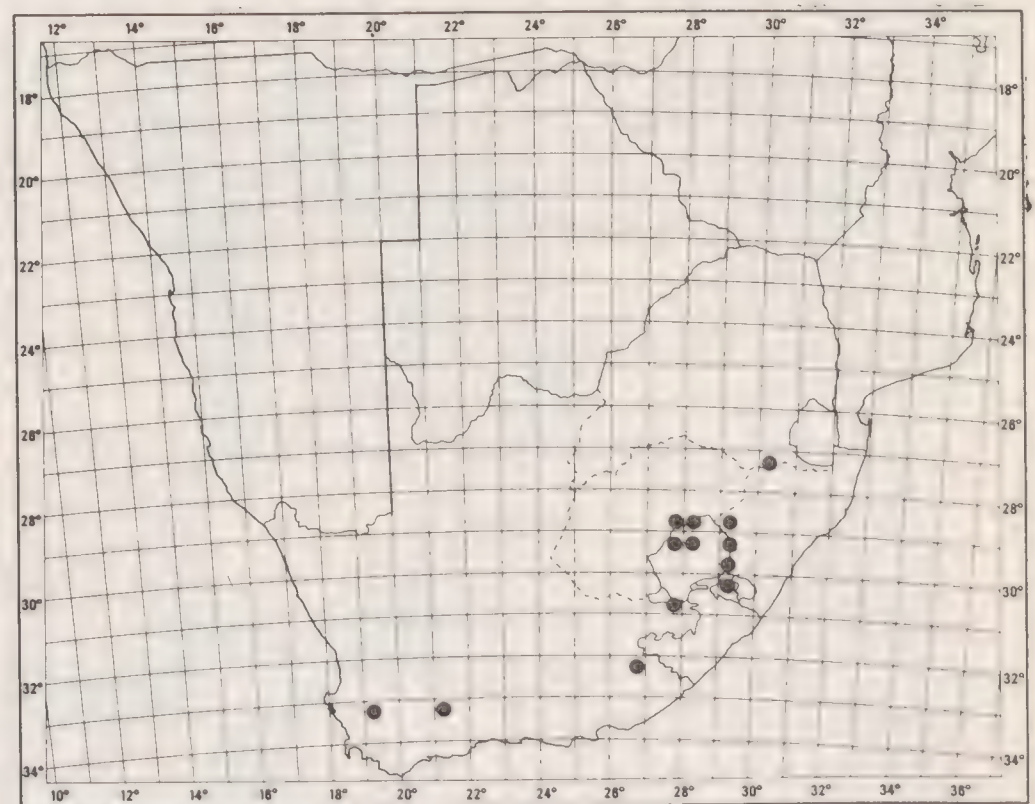
MAP 224.—*Polystichum monticola*

7. *Polystichum alticola* Schelpe & N. C. Anthony in Contr. Bolus Herb. 10: 144 (1982). Type: Cape Province, Ladismith, Swartberg, Toverkop, *Esterhuysen* 26699 (BOL, holo.!; C!; G!; GH!; K!; M!; MO!; NBG!; P!; PRE!).

*Polystichum aculeatum* var. *stenophyllum* Bonap., Not. Ptérid. 14: 215 (1923). Type: Kenya, Mt Kenya, *Allaud* 241 (P, holo.).

Rhizome erect, c. 5 mm in diameter, set with ferrugineous, linear-attenuate, minutely serrulate rhizome-scales c. 7 mm long. *Fron*ds annual, arching; *stipe* shorter than lamina, darker basally, set with ovate to narrowly ovate-attenuate, pale brown and castaneous-striped, minutely lacerate scales c. 10 × 5 mm and smaller different-sized scales; *lamina* softly herbaceous, narrowly ovate-lanceolate, up to 380 × 115 mm, basal pinnae reduced; *pinnae* narrowly and unequally deltate, acute; *pinnules* with aristae c. 1 mm long, upper surface subglabrous, lower surface set with very narrow twisted pale scales c. 1–3 mm long; *venation* somewhat obscure ventrally; *rhachis* set below with spreading, nitid, stramineous to ferrugineous, fimbriate-based scales c. 5 mm long, above with very narrow, somewhat ferrugineous scales c. 3 mm long; *secondary rhachises* set with smaller similar scales. *Indusium* ferrugineous, fimbriate-erose, c. 1 mm in diameter. Fig. 88: 1.

Distributed at high altitudes from the mountains of south-western Cape Province to the Natal and Transvaal Drakensberg. Also Kenya and Uganda. In damp to marshy, usually rock-sheltered localities at 1 300–3 200 m altitude. Map 225.



MAP 225.—*Polystichum alticola*

FIG. 87.—1, *Polystichum luctuosum*, part of plant, × 0.6; 1a, detail of lower surface of pinnule, × 3.6 (*Esterhuysen* 26034).







Vouchers: *Compton* 21334 (NBG); *Devenish* 195 (PRE); *Galpin* 6939 (BOL; PRE; SAM); *Hilliard & Burt* 13714 (E; NU).

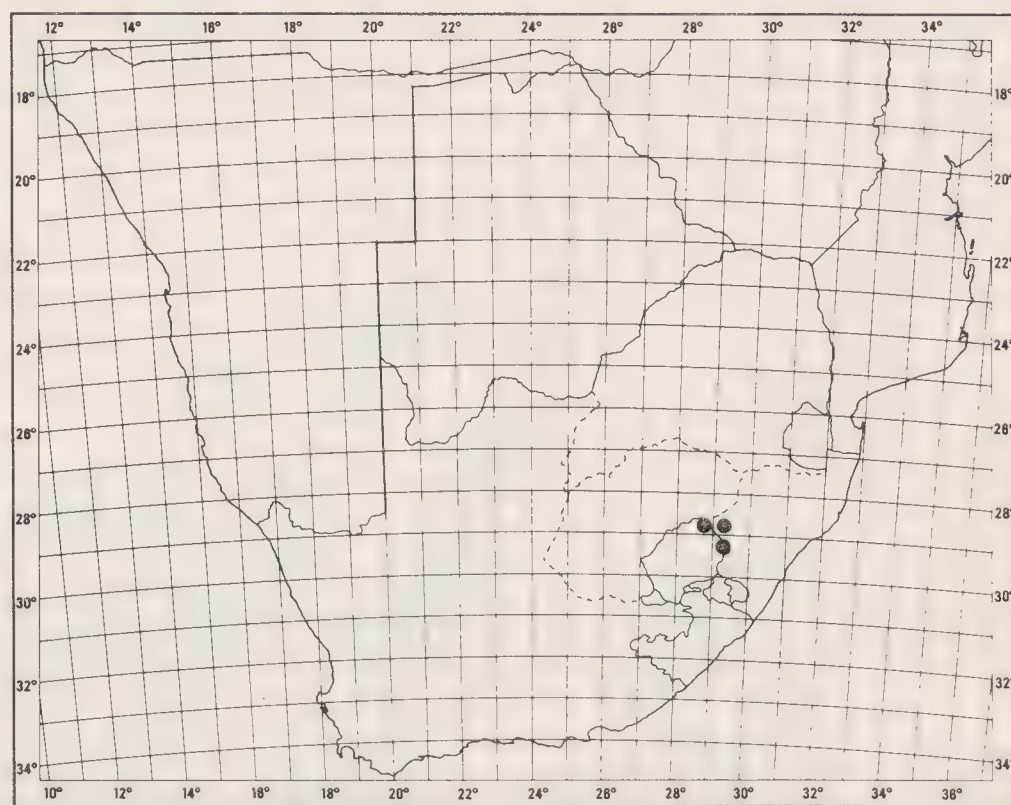
8. ***Polystichum dracomontanum* Schelpe & N. C. Anthony** in Contr. Bolus Herb. 10: 145 (1982). Type: Natal, Bergville, Drakensberg, above Singati Cave, *Esterhuysen* 35646 (BOL, holo.!; B!; C!; GH!; K!; M!; MO!; NU!; P!; PRE!; S!).

Rhizome creeping, c. 6 mm in diameter, set with linear, brown, subentire rhizome-scales, forming tufted erect plants at intervals. *Fron*ds rigidly erect; *stipe* darkened towards base, set with linear, ferrugineous scales c. 25 mm long basally and, above them, atrocastaneous, ovate-lanceolate scales with pale margins; *lamina* thickly coriaceous, broadly lanceolate, c. 340 × 140 mm, 2-pinnate, rarely 3-pinnatifid, acute apically, truncate basally; *pinn*ae sharply serrate or biserrate with acuminate apices; *pinnules* falcate, auriculate, with blunt or sharp aristae, subglabrous above, set with narrow scales along veins below becoming glabrous with age; *venation* obscure; *rhachis* and *secondary rhachises* set with sublinear scales in sulca and with pale, ovate-attenuate, very fimbriate scales below, becoming glabrous with age. *Indusium* brown, nitid, erose to subentire, usually with central processes, c. 1–2 mm in diameter. Fig. 88: 2.

Confined to the Natal Drakensberg, between 1 600 and 3 000 m altitude. Forming large colonies on open slopes. Map 226.

Vouchers: *Edwards* 2145 (NU; PRE); *Esterhuysen* 15486 (BOL; MO; NBG; PRE); 35644 (B; BOL; C; CHR; GH; K; M; MO; NBG; P; PRE; S); *Malan* 7 (BOL; NBG).

The occurrence of hybridisation is well known in the genus (Wagner, 1973) and the species of Southern Africa are no exception. All have been found to be involved in the formation of putative hybrids. Hybrids are particularly common in the Drakensberg area where a number of the distribution ranges overlap.



MAP 226.—*Polystichum dracomontanum*

## 6. ARACHNIODES

***Arachniodes* Blume**, Enum. Pl. Jav. 2: 241 (1828); Schelpe in F.Z. Pterid.: 228 (1970). Type species: *A. aspidioides* Blume.

Rhizome suberect to creeping. *Fron*ds tufted or spaced; *stipe* with brown or ferrugineous scales basally; *lamina* broadly deltate to pentagonal, herbaceous to coriaceous, lower pinnae much developed basiscopically (in African species), much dissected, ultimate segments dentate-aristate (in African species); *veins* free; *rhachis* with ridges on the ventral surface not continuous with leaf margin. *Sori* circular with reniform indusia.

A genus of about 50 species mostly in the Himalayas and China, others in Australia and America and one species in Africa.

***Arachniodes foliosa* (C. Chr.) Schelpe** in Bolm Soc. broteriana, sér. 2, 41: 203 (1967); in F.Z. Pterid.: 228, t. 65 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 450, t. 340 (1983). Type: Kenya, Aberdare Mountains, Kinangop, *Allaud* 255 (BM, holo.!).

*Dryopteris foliosa* C. Chr. in Dansk bot. Ark. 9: 61 (1937).

*Polystichum aristatum* sensu Sim, Ferns S. Afr. edn 2: 119, t. 30 (1915).

Rhizome creeping, up to 7 mm in diameter, set with brown, linear-attenuate, entire rhizome-scales up to 6 mm long. *Fron*ds spaced, arching, firmly herbaceous; *stipe* stramineous, densely scaly basally, up to 370 mm

FIG. 88.—1, *Polystichum alticola*, part of plant, × 0,6; 2a, detail of lower surface of pinnule, × 8,4 (Bowmaker 23). 2, *Polystichum dracomontanum*, part of plant, × 0,6 (*Esterhuysen* 15486); 2a, rhizome, × 0,6 (*Esterhuysen* 26039); 2b, detail of lower surface of pinnule, × 6,9 (*Esterhuysen* 15486).



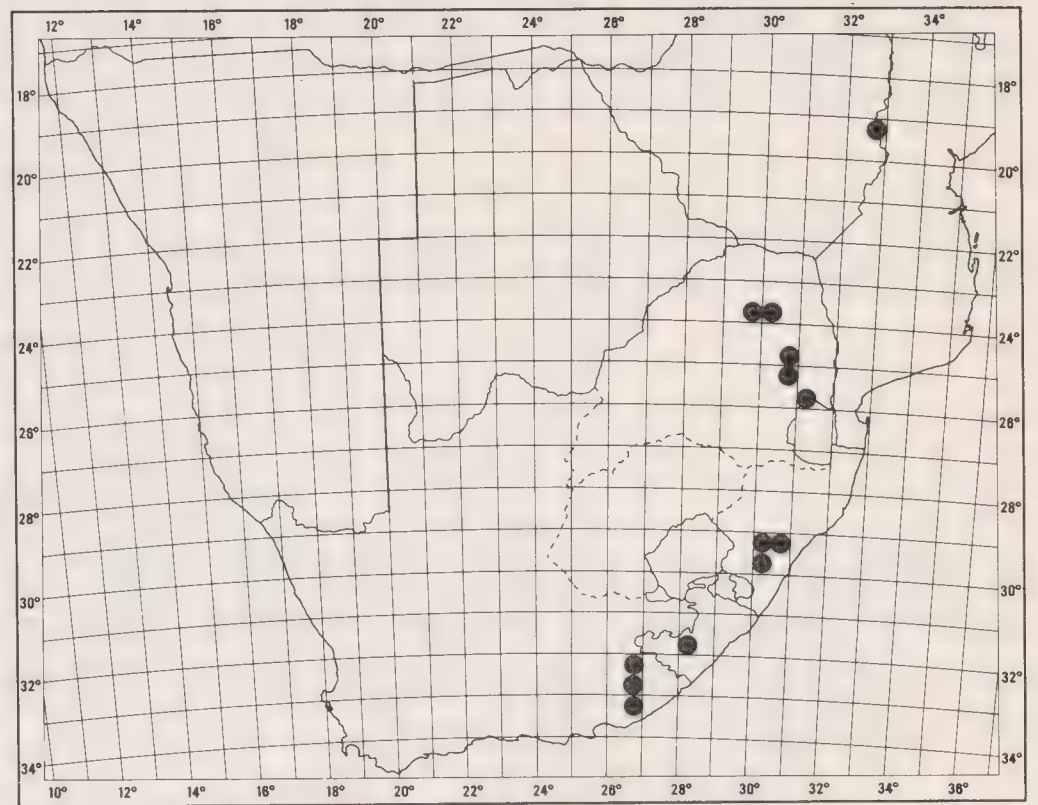




long; *lamina* broadly ovate-deltate, up to  $400 \times 300$  mm, acuminate, 4-pinnatifid basally, 2-pinnatifid above, basal pinnae largest and much developed basiscopically; *upper pinnae* narrowly lanceolate-attenuate; *basal pinnae* unequally and broadly ovate-deltate, up to 190 mm broad, ultimate pinnatifid segments narrowly rhombic and strongly aristate-dentate, glabrous except for hair-pointed ovate-lanceolate scales along costae and costules, and smaller hair-like scales scattered along veins; *rhachis* stramineous, set with scattered scales. *Sori* up to 1 mm in diameter; *indusium* entire, minutely papillose. Fig. 89.

Eastern Cape Province, Transkei, Natal, Transvaal, Zimbabwe, Tanzania, Kenya and Uganda. *A. foliosa* appears to be restricted to escarpment forests in Southern Africa where it occurs sporadically in deep shade in continually moist localities along forest streambanks. In eastern Cape Province it occurs at c. 1 000–1 300 m, in eastern Transvaal at c. 1 650 m, and in eastern Zimbabwe at 2 000 m. Map 227.

Vouchers: *Adams* 164 (NU); *Schelpé* 6053 (B; BOL; C; K; M; MO; P; PR; PRE; S); *Wager* 56 (PRE).



MAP 227.—*Arachniodes foliosa*

## 7. RUMOHRA

**Rumohra Raddi**, Opusc. scient. Bologn. 3: 290 t. 12, 1 (1819); Tardieu-Blot in Fl. Madag. 5, 1: 42 (1958). Type species: *R. aspidioides* Raddi (= *R. adiantiformis* (G. Forst.) Ching).

Rhizome usually long-creeping, sometimes short and ascending, set with entire or subentire rhizome-scales. *Lamina* deltoid, 3-pinnatifid or more divided; *ultimate pinnules* usually rhomboid and aristate; *veins* free. *Sori* dorsal or subterminal on veins; *indusium* peltate or orbicular-reniform. *Spores* with a variously verrucose perispore, rarely smooth.

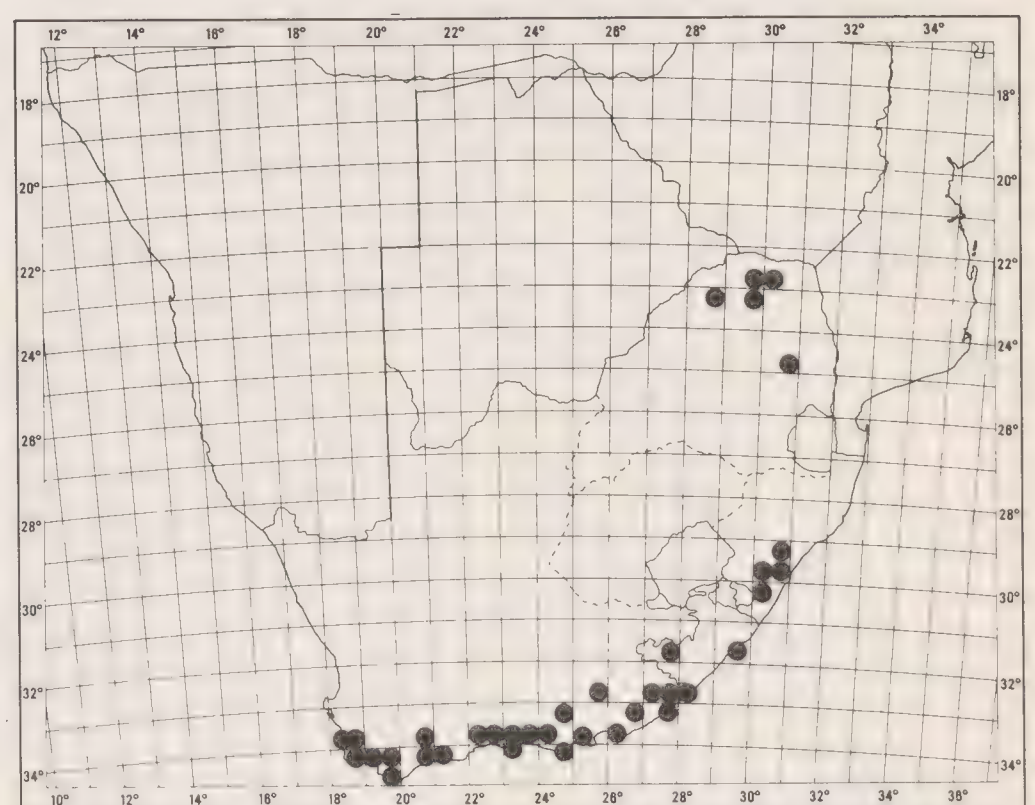
A genus of about 50 species, mostly Asiatic.

**Rumohra adiantiformis** (G. Forst.) Ching in Sinensia 5: 70 (1934); W. B. G. Jacobsen, Ferns Sthn Afr. 457, t. 44, 345 (1983). Type: New Zealand, *Forster* s.n. (BM, holo.!, UPS!).

*Polypodium adiantiforme* G. Forst., Prodr. 82 (1786). *Polystichum adiantiforme* (G. Forst.) J. Sm., Hist. Fil. 220 (1875); Sim, Ferns S. Afr. edn 2: 118, t. 29 (1915). *Dryopteris adiantiformis* (G. Forst.) Kuntze, Rev. Gen. 3, 2: 378 (1898).

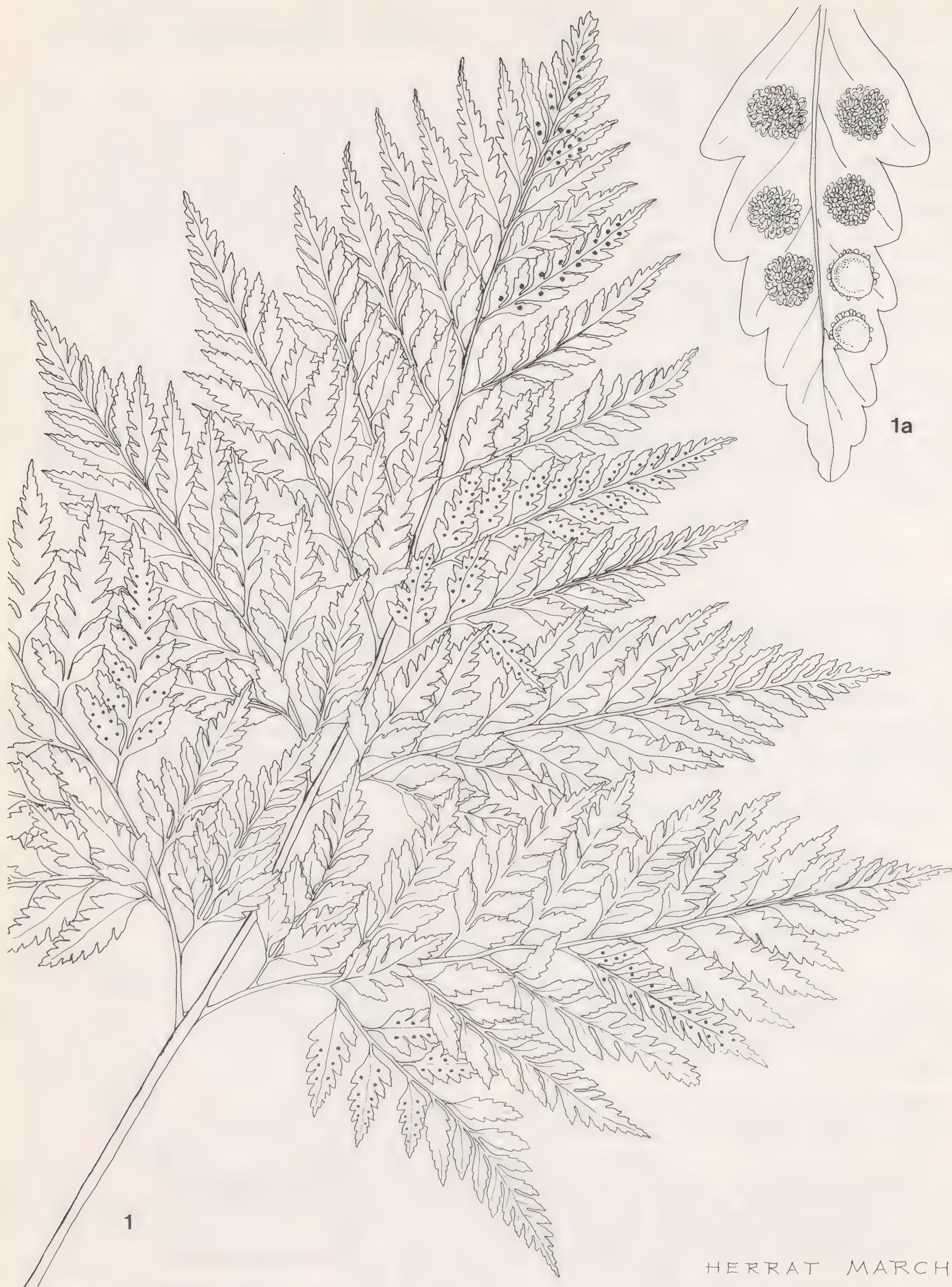
*Aspidium capense* Willd. in Sp. Pl. edn 4,5: 267 (1810), non Swartz (1801). Type: Cape of Good Hope, Herb. Willdenow no. 19803/1 (B, holo.!).

Rhizome creeping, c. 8 mm in diameter, set with membranous, reddish brown, acuminate, erose rhizome-scales c.  $8 \times 3,5$  mm. *Fronde*s spaced, coriaceous; *stipe* brown, sulcate



MAP 228.—*Rumohra adiantiformis*





HERRAT MARCH

FIG. 90.—1, *Rumohra adiantiformis*, frond,  $\times 0,6$ ; 1a, detail of lower surface of ultimate segment,  $\times 3,6$  (Schelpe 4397).



ventrally, set with light brown scales, becoming glabrous with age; *lamina* pentagonal, 3-pinnate to 4-pinnatifid, basal pinnae largest and greatly developed basiscopically; *pinnules* ovate-deltate, leading edge wider and first segment more deeply incised; ultimate segments ovate or oblong, obtuse, margin crenate-dentate, upper surface glabrous, lower surface set with occasional scales on veins. *Sori* c. 2 mm in diameter; *indusium* peltate. Fig. 90.

Cape Province, Natal, Transvaal, Zimbabwe, Mauritius, Réunion, Madagascar, Comoro Islands, Seychelles, Tristan da Cunha, Gough Island, Amsterdam Island, New Zealand, South and Central America. Also recorded from temperate Australia and Polynesia (Dobbie in Crookes, 1951). Occasional in open undergrowth in shade of forest and forest margins, or in rocky ravines, c. 250–1 900 m. Map 228.

Vouchers: *Schlechter* 5952 (BM; GRA; PRE; S); 10351 (BM; BOL; GRA; PRE); *Sim* s.n. (BOL; GRA; PRE).

## 8. HYPODEMATIUM

**Hypodematium** Kunze in Flora 16: 690 (1833); Tardieu-Blot in Fl. Madag. 5, 1: 327 (1958); Schelpe in F.Z. Pterid.: 230 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 90 (1973); in C.F.A. Pterid.: 176 (1977). Type species: *H. onustum* Kunze (= *H. crenatum* (Forssk.) Kuhn).

Rhizome creeping, densely set with lanceolate-acuminate rhizome-scales. *Fronde*s tufted; *stipe* with a tuft of scales basally; *lamina* ovate-deltate to pentagonal, herbaceous, 3- to 4-pinnatifid, lowest pinnae greatly developed basiscopically, pilose with needle-like unicellular hairs; *veins* free. *Sori* subcircular; *indusium* reniform, pilose.

An Old World genus of about 3 species, with only one species in Africa.

**Hypodematium crenatum** (Forssk.) Kuhn in Von Deck., Reisen, Bot. 3, 3: 37 (1879); Schelpe in F.Z. Pterid.: 230, t. 66 (1970); in C.F.A. Pterid.: 176, t. 32 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 451, t. 341 (1983). Type: Yemen, Bulghose, *Forsskal* s.n. (Type lost).

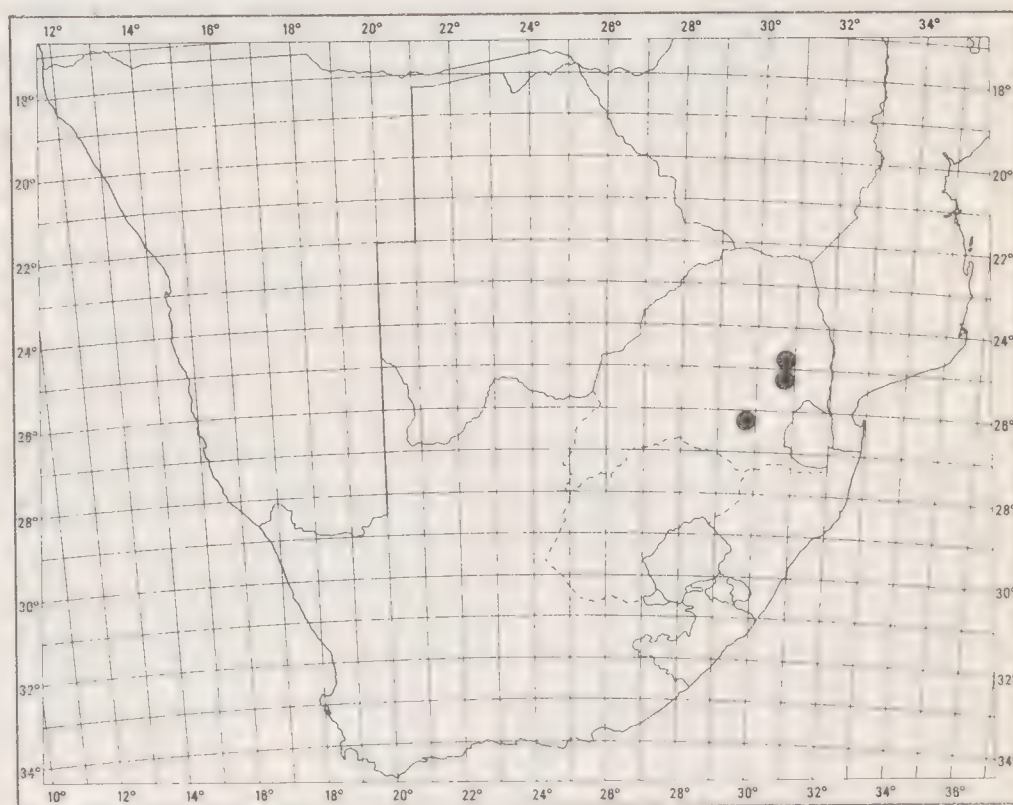
*Polypodium crenatum* Forssk., Fl. Aegypt.-Arab. cxxv, 185 (1775). *Aspidium crenatum* (Forssk.) Kuhn, Fil. Afr. 129 (1868). *Lastrea crenata* (Forssk.) Bedd., Ferns Brit. Ind., Suppl. 18 (1876). *Nephrodium crenatum* (Forssk.) Bak., Fl. Maurit. 497 (1877). *Dryopteris crenata* (Forssk.) Kuntze, Rev. Gen. 2: 811 (1891); Sim, Ferns S. Afr. edn 2: 111, t. 22 (1915).

Rhizome short, set with dense, concolorous ferrugineous, entire rhizome-scales c. 10 mm long. *Fronde*s herbaceous; *stipe* stramineous, up to 120 mm long; *lamina* ovate-deltate, up to 330 × 300 mm, 4-pinnatifid; *pinnae* oblong acute towards apex, unequally deltate-ovate basally, up to 220 mm long; *pinnules* of upper pinnae and basiscopic pinnule segments of basal pinnae up to 20 × 9 mm, deeply pinnatifid into oblong obtuse, crenate lobes, pilose with unicellular hairs on both surfaces; *rhachis* stramineous, pilose. *Sori* up to 12 per pinnule (or pinnule segment of basal pinna), 1–1.5 mm

in diameter; *indusium* reniform, pilose with straight white unicellular hairs. Fig. 82: 2.

Transvaal, Angola, Zambia, Kenya, Ethiopia, Sudan, Yemen, Aden, Cape Verde Islands, Mauritius. Also from India to the Philippine Islands. In Southern Africa *H. crenatum* appears to be confined to those parts of the Transvaal Drakensberg, in the vicinity of Pilgrim's Rest, where dolomitic cliffs are found in a relatively high rainfall area. It is also recorded as growing on alkaline rocks in Angola and Kenya. Map 229.

Vouchers: *Braithwaite* 230 (BOL); *Rogers* 23080 (BOL; PRE).



MAP 229.—*Hypodematium crenatum*



## 9. CTENITIS

**Ctenitis** (*C. Chr.*) *C. Chr. ex Tardieu-Blot* in Notul. syst. 7: 86 (1938); Tardieu-Blot in Mém. Inst. fr. Afr. noire 28: 129 (1953); in Fl. Madag. 5, 1: 328 (1958); Alston in F.W.T.A. edn 2, Suppl. 70 (1959); Tardieu-Blot in Fl. Gabon 8: 156 (1964); in Fl. Camer. 3: 264 (1964); Schelpe in F.Z. Pterid.: 230 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 90 (1973); in C.F.A. Pterid.: 178 (1977). Lectotype species: *C. submarginalis* (Langsd. & Fisch.) Ching (= *Polypodium submarginale* Langsd. & Fisch.).

Rhizome creeping or erect, set with linear to lanceolate rhizome-scales. *Fron*ds tufted or spaced; *stipes* paleaceous basally; *lamina* oblong-herbaceous, lanceolate to deltate-pentagonal, 2- to 4-pinnatifid, set with multicellular hairs along costae and costules; *veins* free. *Sori* circular with reniform indusia.

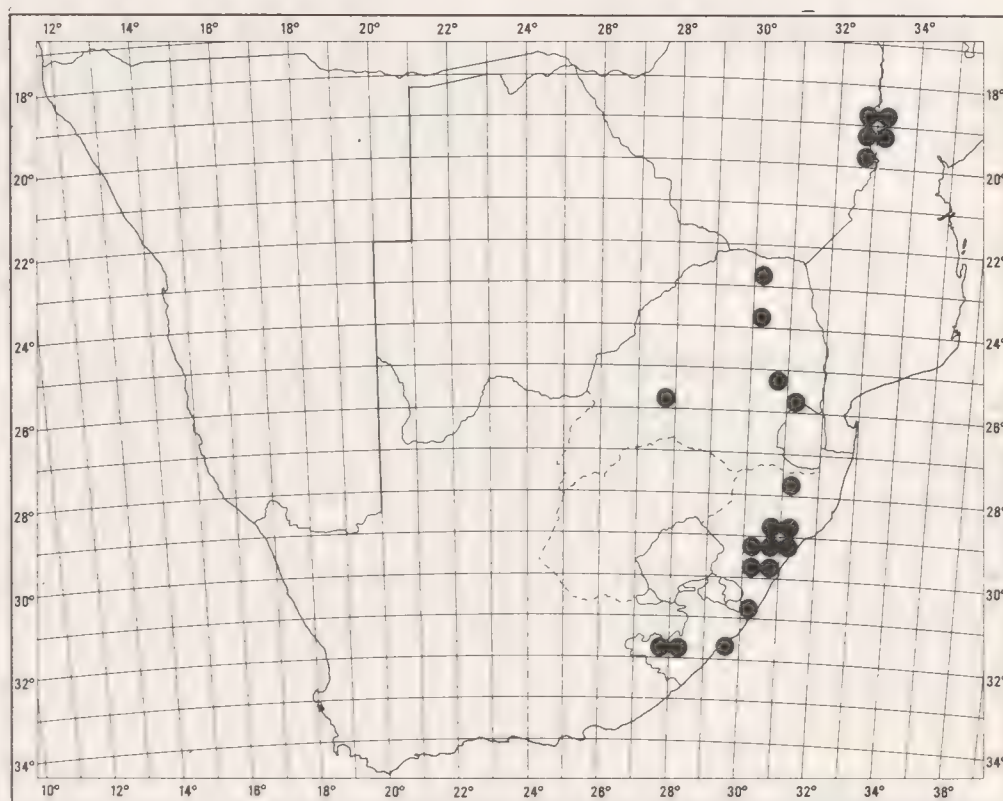
A pantropic genus of c. 150 species.

**Ctenitis lanuginosa** (*Willd. ex Kaulf.*) *Copel.* in Gen. Fil. 124 (1947); Schelpe in F.Z. Pterid.: 232, t. 67B (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 454, t. 343 (1983). Type: Mauritius, *Thouars* s.n., Herb. Willdenow no. 19808 (B, holo.).

*Aspidium lanuginosum* Willd. ex Kaulf., Enum. Fil. 244 (1814). *Nephrodium lanuginosum* (Willd. ex Kaulf.) Desv. in Mém. Soc. Linn., Paris 6, 2: 262 (1827). *Lastrea lanuginosa* (Willd. ex Kaulf.) T. Moore, Ind. Fil. 87 (1958). *Polystichum lanuginosum* (Willd. ex Kaulf.) Keys., Polypod. Cyath. Herb. Bunge 45 (1873). *Dryopteris lanuginosa* (Willd. ex Kaulf.) C. Chr., Ind. Fil. 273 (1906); Sim, Ferns S. Afr. edn 2: 110, t. 21 (1915).

*Aspidium catopterum* Kunze in Linnaea 10: 550 (1836). *Lastrea catoptera* (Kunze) Pappe & Raws., Syn. Fil. Afr. Austr. 12 (1858). *Nephrodium catopterum* (Kunze) Hook., Sp. Fil. 4: 137 (1862). *Dryopteris catoptera* (Kunze) Kuntze, Rev. Gen. 2: 812 (1891). Syntypes: Transkei, between the Umsikaba and Umzimvubu Rivers, *Drège* s.n.; Cape Province, Koratra (Karataru near George), *Drège* s.n. (LZ†). Possible isotype: Cape of Good Hope, *Drège* s.n. (HBG-BOL, photo.).

Rhizome erect, forming a trunk up to 0,45 m high and 0,15 m in diameter, set with golden brown, minutely serrate rhizome-scales up to  $27 \times 2,5$  mm. *Fron*ds tufted, arching, softly herbaceous; *stipe* up to 1 m long, set with scales basally; *lamina* broadly deltate-ovate, c.  $1,3 \times 1,2$  m, acute, deeply 2- to 4-pinnatifid, basal pinnae largest and developed basiscopically; *pinnae* set at an angle of c.  $45^\circ$  to rhachis; *ultimate pinnatifid segments* oblong, incised into weakly crenate to crenate-oblong, truncate to obtuse lobes, pilose with white hairs along cos-



MAP 230.—*Ctenitis lanuginosa*

tules and veins; *rhachis* and *secondary rhachises* minutely pilose at first, becoming subglabrous with age towards base of rhachis. *Sori* c. 1 mm in diameter; *indusium* glabrous, erose, c. 1 mm in diameter. Fig. 84: 1.

Southern Cape Province to Transkei, Natal, Transvaal, Zimbabwe, Mozambique, Malawi, Tanzania, Kenya, São Tomé, Fernando Po, Madagascar, Mauritius, Seychelles and Réunion. On marshy streambanks in forest, usually in dense shade. In Natal and Transvaal it occurs at altitudes from 1 300–1 700 m, and in eastern Zimbabwe and Mozambique from 1 000–1 800 m. Map 230.

Vouchers: *Burrows* 1453 (BOL; NBG); *Fisher* 947 (BOL; NH; NU); *Medley Wood* 10994 (NH; PRE; SAM); *Thorncroft* 57 (PRE).



## 10. TECTARIA

**Tectaria** Cav. in Ann. Hist. Nat. 1, 2: 115 (1799); Tardieu-Blot in Mém. Inst. fr. Afr. noire 28: 141 (1953); in Fl. Madag. 5, 1: 349 (1958); Alston in F.W.T.A. edn 2, Suppl. 73 (1959); Tardieu-Blot in Fl. Gabon 8: 172 (1964); in Fl. Camer. 3: 285 (1964); Schelpe in F.Z. Pterid.: 234 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 92 (1973); in C.F.A. Pterid.: 182 (1977). Type species: *T. trifoliata* (L.) Cav. (= *Polypodium trifoliatum* L.).

Rhizome creeping to erect, set with large, thin, entire rhizome-scales. *Fron*ds mostly tufted; *stipe* scaly, at least basally; *lamina* pinnate to 3-pinnatifid, rarely simple, basal pair of pinnae often developed basiscopically; *ultimate segments* crenate but not aristate; *veins* anastomosing, with or without included veinlets. *Sori* circular, dorsal or terminal on veins; *indusium* peltate, reniform or absent.

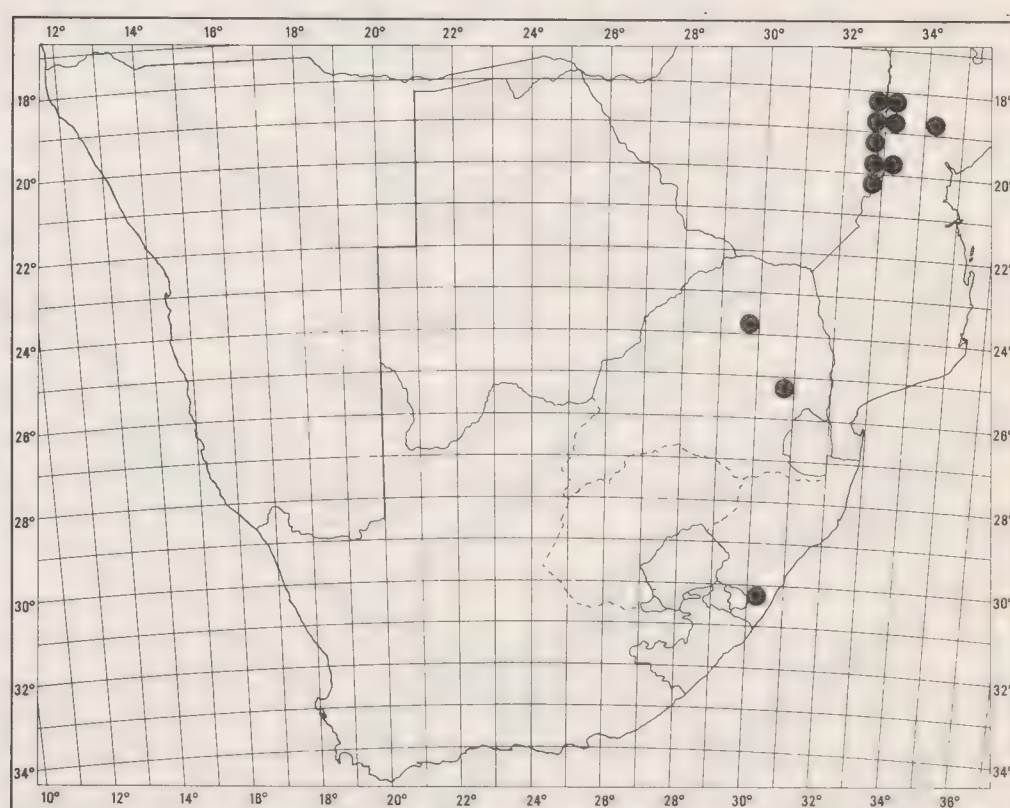
A pantropic genus of over 200 species.

**Tectaria gemmifera** (Fée) Alston in J. Bot., Lond. 77: 288 (1939); Schelpe in F.Z. Pterid.: 234, t. 64D (1970); in C.F.A. Pterid.: 183 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 456, t. 19 (1983). Type: Madagascar, *Perville* s.n. (Type lost).

*Sagenia gemmifera* Fée, Mém. Fam. Foug. 5: 313 (1852). *Aspidium coadunatum* var. *gemmiferum* (Fée) Mett. ex Kuhn, Fil. Afr. 128 (1868). *Aspidium gemmiferum* (Fée) Ching in Bull. Fan Memor. Inst. Biol., Bot. 10: 237 (1941).

*Aspidium cicutarium* sensu Sim, Ferns S. Afr. edn 2: 113, t. 25 (1915).

Rhizome erect, up to 20 mm in diameter, set with very dark brown rhizome-scales up to 8 mm long with paler borders. *Fron*ds arching, herbaceous, with proliferating bulbils up to 10 mm in diameter on costae and costules; *stipe* matt brown, up to 0,75 m long, thinly pubescent with minute white hairs and set with scales basally; *lamina* ovate-deltate-acute, up to 0,9 × 0,6 m, 3-pinnatifid, basal pinnae greatly developed basiscopically, unequally deltate; *upper pinnae* deeply pinnatifid into narrowly oblong, somewhat falcate, crenate, pubescent lobes; *veins* usually anastomosing, without included veinlets; *rhachis* with decurrent lamina wings near apex and pubescent with minute



MAP 231.—**Tectaria gemmifera**

pale brown hairs. *Sori* up to 2 mm in diameter; *indusium* membranous, minutely ciliate, c. 1 mm in diameter. Fig 83: 2.

Transvaal, Zimbabwe, Mozambique, Malawi, Zambia, Angola, Zaire, Tanzania, Uganda, Ethiopia, Sudan, Madagascar and Comoro Islands. On moist forest floors, sometimes locally common, in the tropical forests of Southern Africa at altitudes between 400 and 1 500 m. Map 231.

Vouchers: Braithwaite 165 (BOL); Rogers 18103 (J); Schweickerdt s.n. (PRE).

## BLECHNACEAE

Terrestrial, lithophytic or epiphytic plants. *Rhizome* creeping to erect, sometimes forming a caudex, dictyostelic, set with non-peltate, non-clathrate rhizome-scales. *Fron*ds dimorphous to a greater or lesser extent; *stipe* not articulated, with numerous vascular strands; *lamina* pinnate or deeply pinnatifid (infrequently 2-pinnatifid), basal pinnae reduced or not; *veins* free or anastomosing. *Sori* linear (less frequently discontinuous), usually borne on a secondary vein parallel to costa, between costa and margin; *indusia* linear, opening towards costa, or absent. *Spores* monolete, with or without perispore.

Indusium present; fertile frond usually pinnate; rhizome erect or creeping, rarely ascending trees..... 1. **Blechnum**  
Indusium absent; fertile frond usually 2-pinnate; rhizome ascending trees ..... 2. **Stenochlaena**





FIG. 91.—1, *Blechnum giganteum*, sterile frond,  $\times 0,6$ ; 1a, fertile frond,  $\times 0,6$  (Schelpe 5534).



## 1. BLECHNUM

**Blechnum** L., Sp. Pl. 1077 (1753); Gen. Pl. edn 5: 485 (1754); Engl., Pflanzenw. Afr. 2: 32 (1908); Tardieu-Blot in Mém. Inst. fr. Afr. noire 28: 201 (1953); Alston in F.W.T.A. edn 2, Suppl. 74 (1959); Tardieu-Blot in Fl. Madag. 5, 2: 1 (1960); in Fl. Camer. 3: 293 (1964); Launert in F.S.W.A. 8: 1 (1969); Schelpe in F.Z. Pterid.: 235 (1970); in Expl. Hydrobiol. Bassin L. Bangw. & Luapula 8, 3 Pterid.: 92 (1973); in C.F.A. Pterid.: 184 (1977). Lectotype species: *B. occidentale* L.

Rhizome creeping or erect, sometimes forming a short caudex, set with brown rhizome-scales. *Fronds* tufted; *lamina* pinnatifid to pinnate (rarely 2-pinnatifid); *veins* free in sterile fronds. *Sori* linear, indusiate.

A cosmopolitan genus of over 200 species, mostly in the southern hemisphere, with 7 species in continental Africa.

- 1a Sterile pinnae with bases broadest and wholly adnate to rhachis or only slightly free basiscopically:
  - 2a Basal pinnae reduced, but lamina not decrescent; sterile pinna apices obtuse to acute; rhachis usually raised and flat or shallowly sulcate above ..... 1. *B. inflexum*
  - 2b Lamina longly decrescent, basal pinnae becoming deltate and then rudimentary at extreme base; sterile pinna apices attenuate to acute-acuminate; rhachis usually sunken, deeply sulcate above ..... 2. *B. giganteum*
- 1b Sterile pinnae with bases unequally cuneate-adnate or petiolate:
  - 3a Sterile pinna margin obviously serrate; scales at base of stipe ovate-acute ..... 3. *B. capense*
  - 3b Sterile pinna margin entire to the naked eye; scales at base of stipe lanceolate-attenuate:
    - 4a Lamina very thickly coriaceous; sterile pinnae unequally cuneate basally, never auriculate, seldom petiolate ..... 4. *B. tabulare*
    - 4b Lamina membranous to coriaceous; sterile lamina with at least lower pinnae petiolate, auriculate to a greater or lesser extent:
      - 5a Pinna apices mucronate in robust specimens, rounded entire in high altitude plants; margin bearing minute transparent teeth; lamina apex acute; indusium erose-lacerate ..... 5. *B. australe*
      - 5b Pinna apices acute to attenuate in robust specimens, dentate in high altitude plants; margin without minute transparent teeth; lamina apex cuspidate; indusium subentire ..... 6. *B. punctulatum*

1. ***Blechnum inflexum*** (Kunze) Kuhn, Fil. Afr. 92 (1868); Sim, Ferns S. Afr. edn 2: 178, t. 74 (1915); Schelpe in F.Z. Pterid.: 236 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 461, t. 347 (1983). Type: South Africa, "Herrn Gueinzius am Vorgebirge der guten Hoffnung ... ohne Angabe des Standorts eingesandt" (LZ†); Cape Province, Ceres, Hansiesberg, *Es-terhuysen* 25747 (BOL, neo.!, B!; C!; K!; M!; MO!; P!; PR!; PRE!; S!).

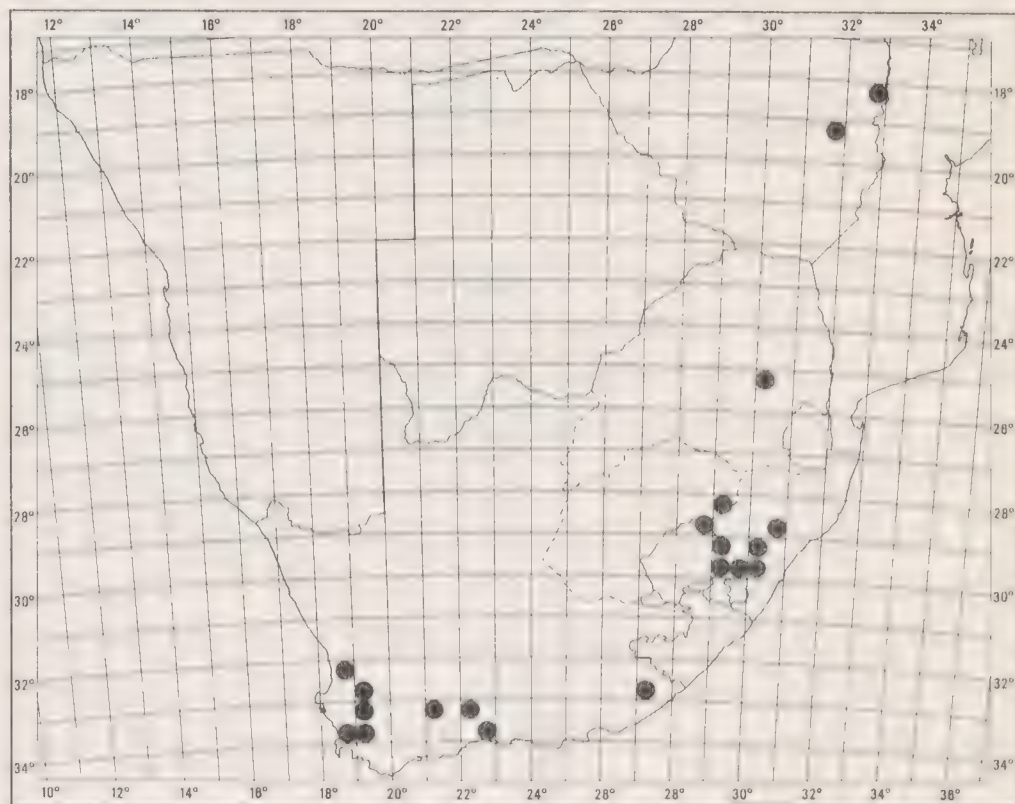
*Lomaria inflexa* Kunze, Farnkr. 1, 7: 150 t. 65 (1844). *Struthiopteris inflexa* (Kunze) Ching in Sunyatsenia 5: 243 (1940).

*Lomaria discolor* var. *natalensis* Bak. in Hook. & Bak., Syn. Fil. edn 2: 481 (1874). Type: Natal, *McKen & Buchanan* (K, holo.!).

Rhizome erect to procumbent, c. 5 mm in diameter, set with linear-attenuate, entire, light brown, concolorous and striped rhizome-scales 8–18 mm long. *Fronds* erect, thinly coriaceous; *stipe* brown, darkening basally, with a conspicuous mass of squarrose scales basally otherwise subglabrous at maturity; *sterile lamina* narrowly oblong-elliptic, acute, up to 300 × 95 mm, very deeply pinnatifid to pinnate, basal pinnae reduced; *pinnae* narrowly oblong, entire, acute to obtuse, sessile, slightly auriculate acroscopically, glabrous on both surfaces; *fer-*

*tile lamina* conspicuously shorter, very narrowly oblong, acute, up to 180 × 40 mm, basal pinnae reduced; *pinnae* linear, subsessile, a mucronate tip extending beyond sori; *venation* apparent. *Sori* extending most of the length of fertile pinnae; *indusium* dark brown, deeply lacerate, up to 2 mm broad. Fig. 93: 2.

Cape Province, Natal, Transvaal and Zimbabwe. In the mountains of south-western Cape Province *B. inflexum* occurs in colonies or as individuals along streambanks above 1 000 m altitude. In the eastern parts of Southern



MAP 232.—*Blechnum inflexum*







Africa the species usually occurs on streambanks with little or no shade, or around boulder bases, between 600 and 2 000 m altitude. Map 232.

Vouchers: *Clarkson* 82 (BOL; NU); *Schelte* 4573 (B; BOL; C; K; M; MO; P; PR; PRE; S); *Taylor* s.n. (BOL).

2. ***Blechnum giganteum* (Kaulf.) Schlechtd.**, Adumbr. 36, t. 20, 22 fig. 1 (1827); W. B. G. Jacobsen, Ferns Sthn Afr. 460, t. 346 (1983). Type: Cape Province, Cape Peninsula, Kirstenbosch, ? *Bergius* s.n. (HAL, holo.-K, photo.).

*Lomaria gigantea* Kaulf., Enum. Fil. 150 (1824). *Blechnum attenuatum* var. *giganteum* (Kaulf.) Bonap. in Sarasin & Roux, Nova Caledonia 1: 43 (1914); Schelte in F.Z. Pterid.: 236 (1970).

*Lomaria heterophylla* Desv. in Mag. Ges. naturf. Freunde Berl. 5: 330 (1811). *Blechnum heterophyllum* (Desv.) Schlechtd., Adumbr. 37 (1827). Type: Cape of Good Hope, *Sonnerat* s.n., Herb. Jussieu no. 1278 (P, holo.!-BM & BOL, photo.!).

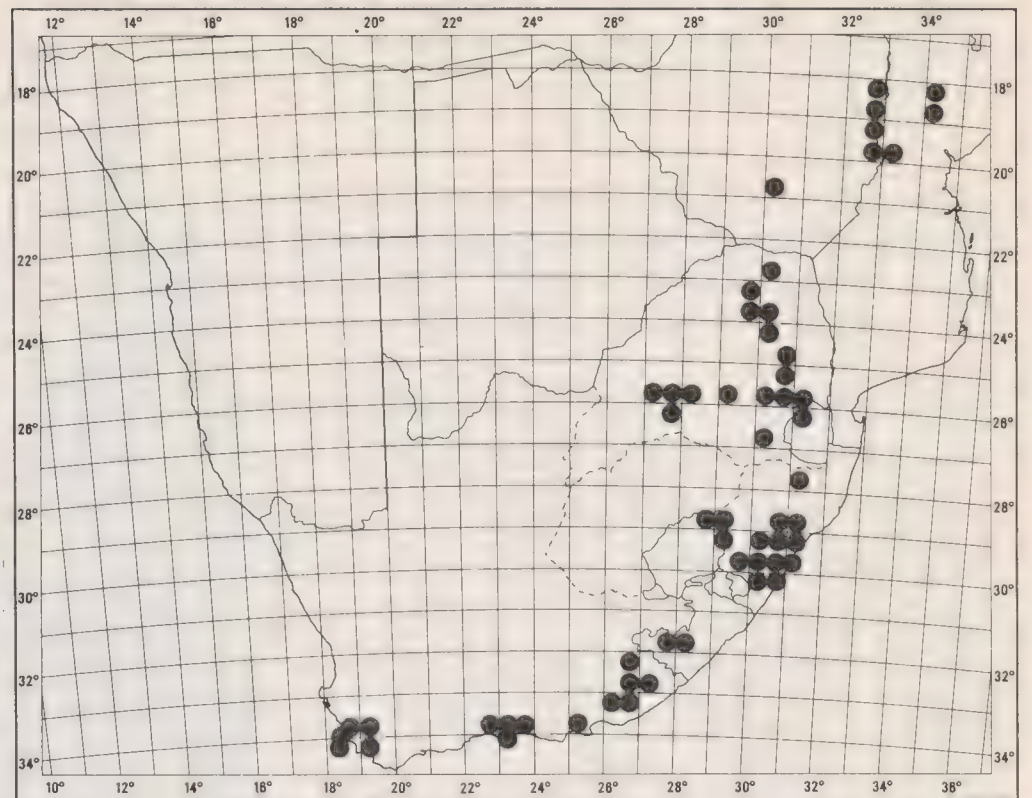
*Lomaria hamata* Kaulf., Enum. Fil. 150 (1824). Type: Cape of Good Hope (?HAL, holo.).

*Lomaria punctata* Blume, Enum. Pl. Jav. 201 (1828). (Type not found).

*Lomaria decipiens* Pappe & Raws., Syn. Fil. Afr. Austr. 29 (1858). Type: Cape Province, near Grahamstown, *Atherstone* s.n. (K, lecto.!).

*Blechnum attenuatum* sensu Sim, Ferns S. Afr. edn 2: 179, t. 75, 76 figs 2, 3 (1915).

Rhizome creeping, up to 450 mm long, 20–34 mm in diameter, set with dark brown, subulate rhizome-scales up to  $42 \times 3$  mm, sometimes spirally twisted when dry. *Fronds* arching, thinly coriaceous; *stipe* light brown to stramineous, sulcate, set with occasional scales near base; *sterile lamina* elliptic, up to  $1,8 \times 0,22$  m, pinnate (occasionally 2-pinnatifid) lower pinnae gradually decrescent; *pinnae* narrowly oblong-attenuate, entire (occasionally irregularly pinnatifid or slightly undulate), sessile with an abruptly widened base wholly adnate to rhachis and somewhat contiguous, margin narrowly reflexed, upper surface glabrous, lower surface set with occasional scales along costa; *fertile lamina* elliptic, pinnate; *pinnae* linear, sessile with an abruptly widened base adnate to rhachis, often recurved or pendent. *Sori* extending from above base almost to apex of fertile pinnae; *indusium* dark brown, erose, c. 1 mm broad. Fig. 91.



MAP 233.—*Blechnum giganteum*

Cape Province, Transkei, Natal, Swaziland, Transvaal, Zimbabwe, Mozambique, Malawi, Tanzania, Uganda, Comoro Islands, Mauritius and Réunion. Terrestrial or lithophytic in forest undergrowth, c. 100–2 000 m. Map 233.

Vouchers: *Fisher* 941 (NH; NU); *Guy & Ward* 17 (NPB; NU); *Pegler* 962 (BOL; PRE); *Schütte* 7 (BM; BOL); *Wasserfall* 85 (NBG; PRE).

*B. giganteum* is a much larger terrestrial or lithophytic plant than the commonly epiphytic tropical African *B. attenuatum* (Swartz) Mett. The pale reddish developing fronds of *B. giganteum* constitute a useful field character.

3. ***Blechnum capense* Burm. f.**, Prodr. 28 (1768). Type: Cape of Good Hope (G, lecto.-BOL, photo.!).

*Osmunda capensis* L., Mant. Alt. 306 (1771). *Onoclea capensis* (L.) Swartz, Syn. Fil. 111 (1806). *Lomaria capensis* (L.) Willd. in L., Sp. Pl. edn 4, 5: 291 (1810). *Blechnum capense* (L.) Schlechtd., Adumbr. 34 (1827), t. 18 (1826); Sim, Ferns S. Afr. edn 2: 186, t. 82 (1915); Schelte in F.Z. Pterid.: 239 (1970). *Spicanta capensis* (L.) Kuntze, Rev. Gen. 2: 821 (1891).

*Blechnum sylvaticum* Schelte in Jl S. Afr. Bot. 45: 221 (1979); W. B. G. Jacobsen, Ferns Sthn Afr. 464, t. 350 (1983). Type: Cape Province, Cape Peninsula, between Table Mountain and Devil's Peak, *Koenig* s.n. (LINN 1244/11, holo.!).

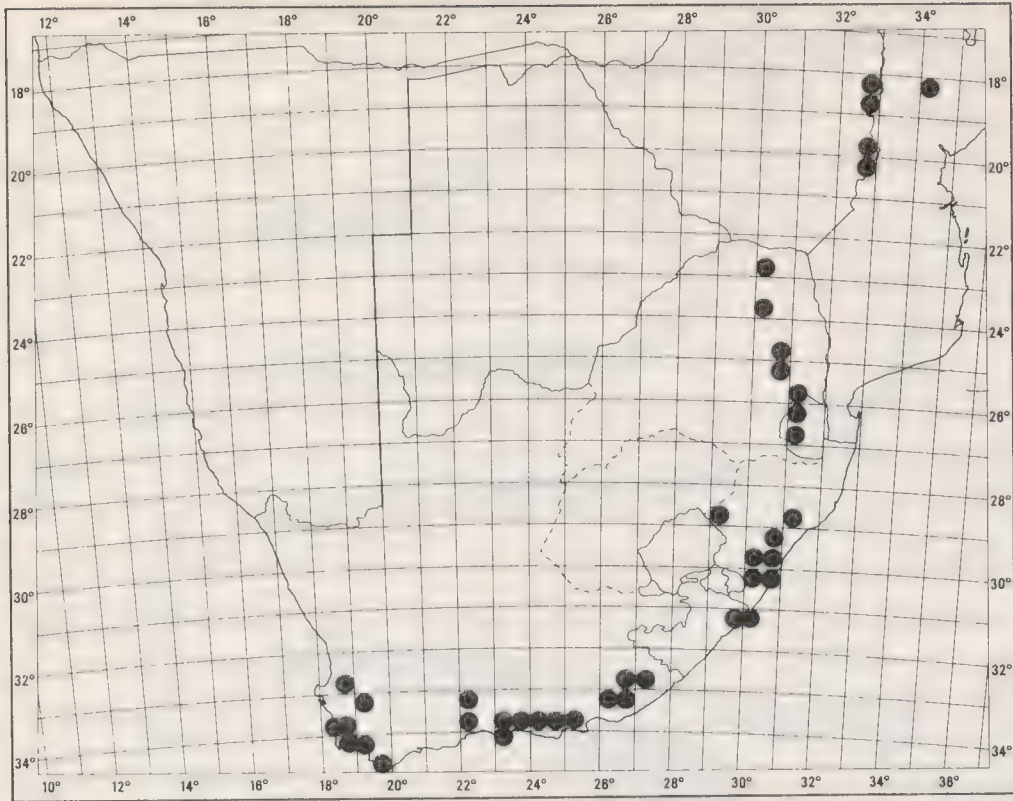
Rhizome creeping, up to 20 mm in diameter, set with ovate-acuminate, entire, light brown, concolorous rhizome-scales c. 10 mm long. *Fronds* arching, firmly herbaceous; *stipe* castaneous, nitid, set with scattered ovate-acute scales basally; *sterile lamina* oblong-acute, up to  $0,63 \times 0,22$  m, lower pinnae not reduced; *pinnae* shortly petiolate, base cuneate, minutely serrate, glabrous except for a few hair-like scales along the raised and sulcate costa above,





FIG. 93.—1, *Blechnum tabulare*, sterile frond,  $\times 0,6$ ; 1a, fertile frond,  $\times 0,6$  (Schelpe 5936). 2, *Blechnum inflexum*, sterile frond,  $\times 0,6$ ; 2a, fertile frond,  $\times 0,6$  (Esterhuysen 26042).



MAP 234.—*Blechnum capense*

set with hair-like scales and with brown ovate-lanceolate scales up to 3 mm long along costa below; *fertile lamina* narrowly oblong-acute, up to  $0,4 \times 0,13$  m, lower pinnae not reduced; *pinnae* undulate, narrowly linear-acuminate, petiolate, somewhat auriculate basally, set with hair-like scales, and with ovate-lanceolate scales along costa below. *Sori* extending from base almost to apex of fertile pinnae; *indusium* dark brown, lacerate, c. 1,5 mm broad. Fig. 92.

Cape Province, Transkei, Natal, Swaziland, Transvaal, Zimbabwe, Mozambique and Malawi. Along stream-banks in shade, in moist exposed situations, or dominant in undergrowths of wet forest in southern Cape Province, 175–1 800 m. Map 234.

Vouchers: *Johnstone* 119 (NU); *Mott* 82 (BOL; UBLS); *Paterson* 3256 (BOL; PRE); *Schelpé* 4122 (BM; BOL); *Thode* A 2585 (K; NH; PRE).

*Blechnum capense* (L.) Schlechtd. (1825) is antedated by *Blechnum capense* Burm. f. (1768). The application of the name *Blechnum capense* Burm. f. is explained by Roux (1982).

4. *Blechnum tabulare* (Thunb.) Kuhn, Fil. Afr. 94 (1868); Sim, Ferns S. Afr. edn 2: 187, t. 83 (1915); Schelpé in F.Z. Pterid.: 237 (1970); in C.F.A. Pterid.: 184 (1977); W. B. G. Jacobsen, Ferns Sthn Afr. 463, t. 42, 349 (1983). Type: Cape Province, Cape Peninsula, Table Mountain, Herb. Thunberg (UPS, holo.!, S-BOL, photo.!).

*Pteris tabularis* Thunb., Prodr. 171 (1800). *Lomaria tabularis* (Thunb.) Mett. ex Bak. in Mart., Fl. Bras. 1, 2: 418 (1870).

*Lomaria coriacea* Schrad. in Gött. Gel. Anz. 1818: 916 (1818). Type: South Africa, *Hesse* s.n. (?LE, holo.).

*Lomaria gueinzii* Moug. ex Fée, Mém. Fam. Foug. 5: 69 (1852). Type: South Africa, *Gueinzii* s.n., Herb. Moug. (Type not found).

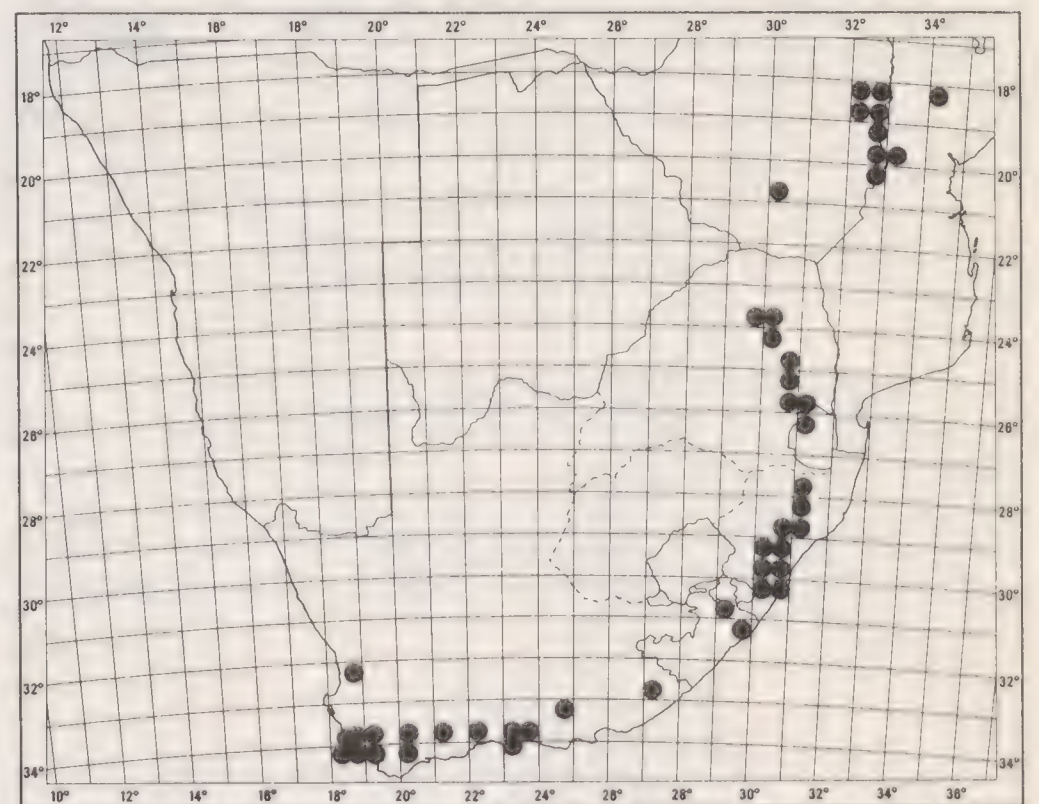
*Lomaria cycadoides* Pappe & Raws., Syn. Fil. Afr. Austr. 2 (1858). *Blechnum cycadoides* (Pappe & Raws.) Kuhn, Fil. Afr. 91 (1868). Type: Natal, *Plant* 335 (Type not found).

*Lomaria dalgairnsiae* Pappe & Raws., Syn. Fil. Afr. Austr. 27 (1858). *Blechnum dalgairnsiae* (Pappe & Raws.) Kuhn, Fil. Afr. 92 (1868). Type: Cape Province, near Knysna, *Dalgairns* s.n., Herb. Rawson (BM, holo.!).

Rhizome erect or procumbent, up to 0,9 m long and 0,1 m in diameter, set with very narrowly linear-attenuate, entire rhizome-scales up to 35 mm long with a dark brown to ebeneous central stripe and pale borders. *Fronds* erect to suberect, coriaceous, dimorphous; *stipe* pale brown, with a conspicuous tuft of scales basally; *lamina* narrowly oblong, acute, up to  $1,4 \times 0,36$  m, with a narrowly oblong acute terminal segment, base with up to 9 pairs of gradually reduced pinnae, the lowest rudimentary; *sterile pinnae* subsessile with an unequally cuneate base, entire, usually revolute, upper surface glabrous, lower surface set with hair-like scales and with ovate-fimbriate scales along costa; *fertile pinnae* subsessile to very shortly petiolate. *Sori* extending almost the whole length of fertile pinnae; *indusium* pale brown, linear, lacerate at maturity, c. 1,5 mm broad. Fig. 93: 1.

Cape Province, Natal, Transvaal, Swaziland, Zimbabwe, Mozambique, Malawi, Zambia, Angola, Zaire, Tanzania, Uganda and Madagascar. On the mountains of south-western Cape Province *B. tabulare* can form extensive colonies on moist but exposed slopes and screes from 300 to 1 650 m elevation. In the summer rainfall area, such as in Natal and Transvaal, this species occurs in grassland, either in moist depressions or around boulder bases, always in full exposure, at altitudes from 900 to 1 450 m. Map 235.

Vouchers: *Fisher* 835 (NU; PRE); *Schelpé* 1656 (BOL; NH; NU); *Schlechter* 6649 (BM; K; PRE).

MAP 235.—*Blechnum tabulare*







5. *Blechnum australe* L., Mant. Alt. 130 (1767); Sim, Ferns S. Afr. edn 2: 188, t. 84 (1915); Launert in F.S.W.A. 8: 1 (1969); Schelpe in F.Z. Pterid.: 240 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 469, t. 352 (1983). Type: Cape of Good Hope (LINN 1247/3, holo.).

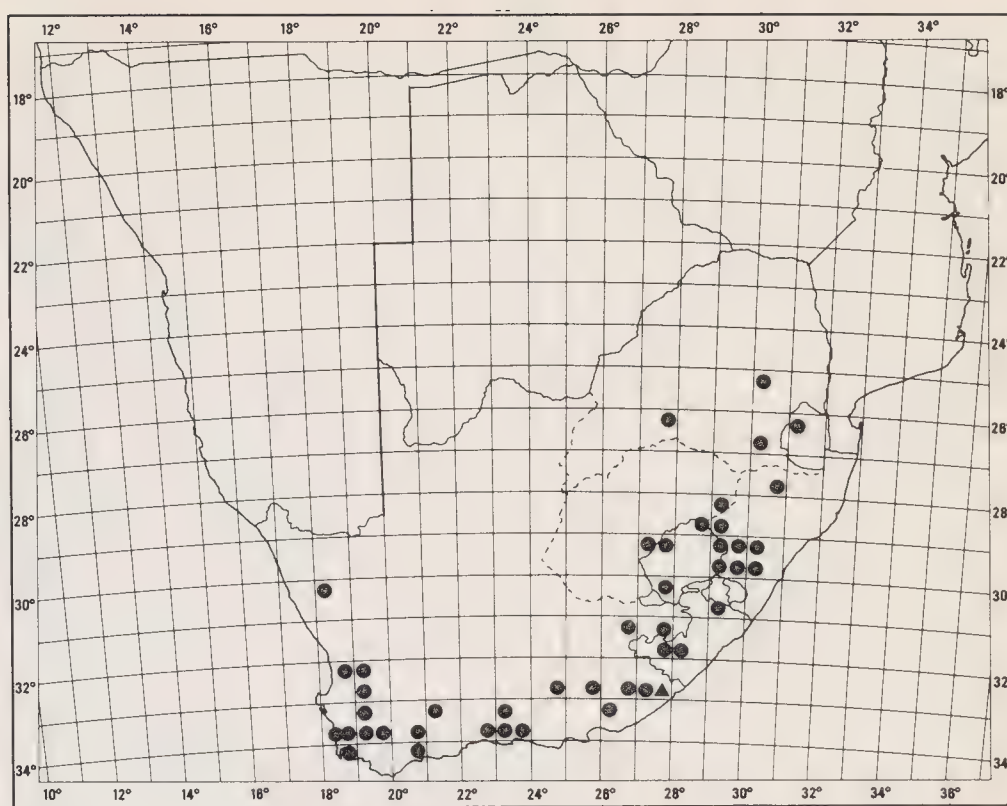
Rhizome creeping, branching, up to 6 mm in diameter, set with brown, nitid, lanceolate-attenuate, entire, concolorous and striped rhizome-scales c.  $5.5 \times 1$  mm. Fronds tufted, erect or arching, firmly membranous or herbaceous, to thinly coriaceous, green, glabrous or glandular; stipe pale brown to stramineous, darker and set with scales basally, less than  $\frac{1}{2}$  lamina length; lamina very narrowly elliptic to lanceolate, acute or acuminate, up to  $500 \times 130$  mm, pinnate with several pairs of basal pinnae reduced, pinnae edged with transparent cells which form one or two rows of minute teeth in mature fronds; sterile pinnae oblong-acute, mucronate, up to c.  $30 \times 8$  mm, base somewhat auriculate, subsessile to very shortly petiolate; fertile pinnae linear, falcate, mucronate, c.  $30 \times 3$  mm, base conspicuously expanded into two subdeltate, often mucronate, auriculae; rhachis sulcate. Sori extending most of the length of fertile pinnae, expanded base of lower pinnae and reduced pinnae sterile; indusium brown, thinly membranous, erose-lacerate, c. 0.6 mm broad. Fig. 94: 1.

A number of aberrant fronds have been found which display a trend towards sorus division and simultaneous lack of reduction of the fertile frond. In the similar case of *B. punctulatum* Swartz a number of varieties have been established for convenience of reference and the same has been done for *B. australe*.

Sori 2 per pinna, in unbroken lines on either side of costa; fertile lamina only slightly broader ..... (a). var. *australe*  
Sori discrete, set at an angle to costa; fertile lamina not reduced, but similar to sterile lamina ..... (b). var. *aberrans*

#### 5 (a). var. *australe*.

*Lomaria australis* (L.) Link, Fil. Hort. Berol. 75 (1841). *Mesothema australe* (L.) Presl, Epim. Bot. 111 (1851), reimpr. in Abh. K. Böhm. Ges. Wiss., ser. 5, 6: 472 (1851). *Blechnopteris australis* (L.) Trevisan in Atti Ist. Veneto 2, 2: 166 (1851). *Struthiopteris australis* (L.) Trevisan in Atti Ist. Veneto 3, 14: 572 (1869). *Spicanta australis* (L.) Kuntze, Rev. Gen. 2: 821 (1891).



MAP 236.—*Blechnum australe*

*Lomaria pumila* Kaulf., Enum. Fil. 151 (1824). Type: Cape of Good Hope (?HAL, holo.).

Cape Province, Transkei, Natal, Lesotho, Orange Free State, Transvaal, Zimbabwe, Kenya, Madagascar, Tristan da Cunha and Gough Island. On shaded streambanks and near waterfalls, and in the shelter of rock overhangs and crevices, 250–2 100 m. Map 236.

Vouchers: Esterhuysen 25802 (B; BM; BOL; MO; PR; PRE); 27210 (BM; BOL; MO; P; PR; PRE); Hilliard & Burt 11919 (NU); Pott 4845 (BOL); Schelpe 5897 (BM; BOL).

The high altitude rock crevice forms of *B. australe*, in which the marginal teeth are seldom developed, can be distinguished from those of *B. punctulatum* (which are of a similar texture) by the lanceolate shape of the fronds and the entire or mucronate pinna apices, as opposed to the cuspidate frond apex and the somewhat dentate pinna margins of the latter. Until research into the function and constancy of the glands in forma *glanduliferum* Schelpe has been carried out, it is preferred not to maintain this form as separate.

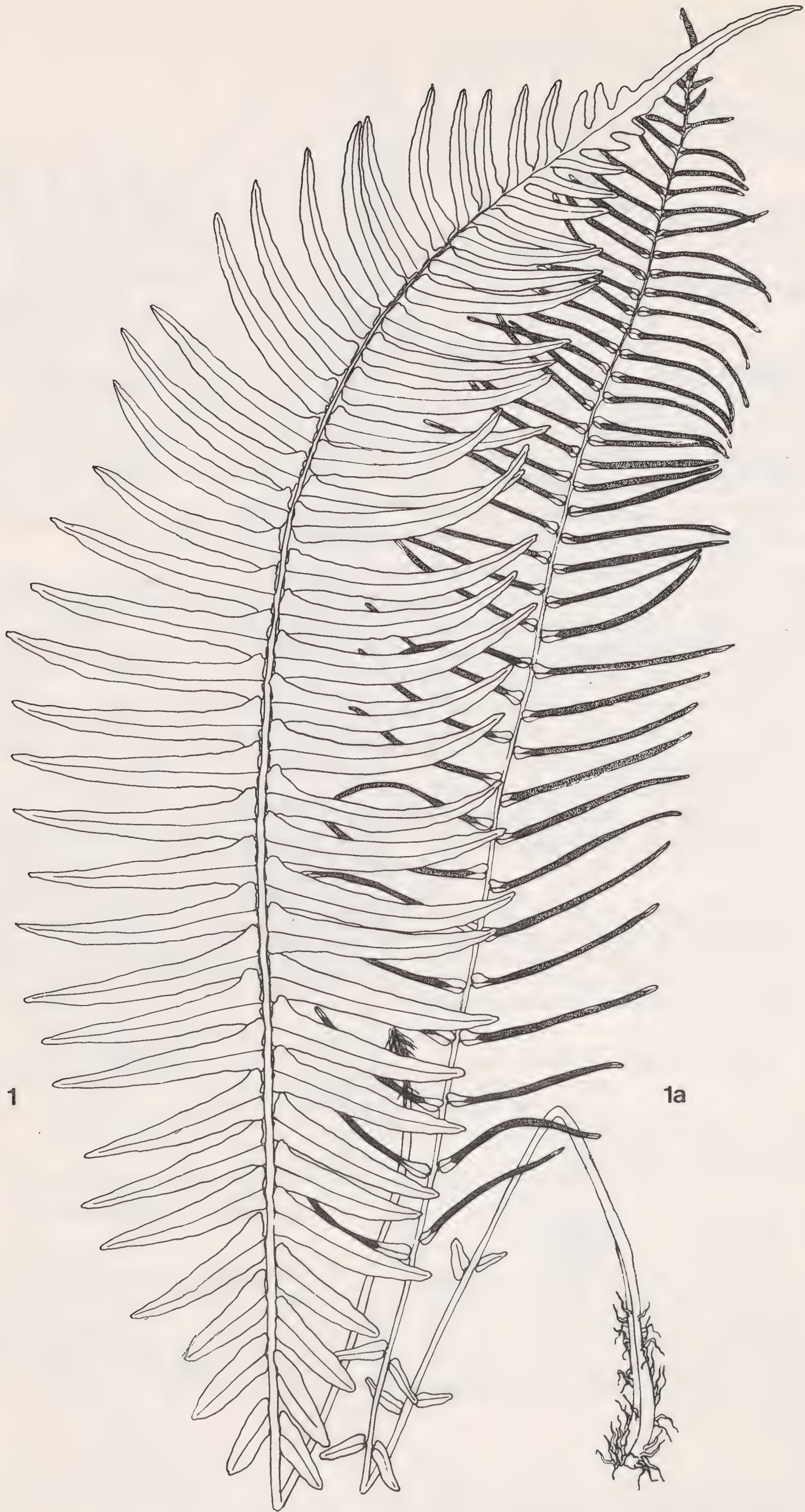
5(b). var. *aberrans* N. C. Anthony & Schelpe in Bothalia 15: 555 (1985). Type: Transkei, Amabele, Hardcastle 297 (NBG, holo.).

Occasional amongst populations of *B. australe*.

Voucher: Glass s.n. (SAM 24666).

6. *Blechnum punctulatum* Swartz in J. Bot., Gött. 1800, 2: 74 (1802); Sim, Ferns S. Afr. edn 2: 181, t. 77 (1915); Schelpe in F.Z. Pterid.: 239 (1970). Type: Cape of Good Hope, Thunberg s.n., Herb. Swartz (S, holo.—BOL, photo.).







Rhizome creeping, branched, up to 10 mm in diameter, set with brown, nitid, lanceolate-attenuate, entire, concolorous and striped rhizome-scales c.  $7 \times 1$  mm. *Fronde*s tufted, erect, coriaceous, greyish green (or occasionally firmly membranous, green), glabrous or glandular; *stipe* pale brown to stramineous, darker and set with scales basally, less than  $\frac{1}{4}$  lamina length; *lamina* oblong-elliptic, apex somewhat cuspidate, up to  $760 \times 100$  mm, pinnate, with a long tapering base, lowest pinnae often rudimentary, margin entire in robust specimens, often dentate in high altitude, rock crevice specimens; *sterile pinnae* oblong-attenuate from an auriculate base, auriculae overlapping rhachis, up to  $85 \times 12$  mm, subsessile to shortly petiolate; *fertile pinnae* linear, acute, c.  $60 \times 2,5$  mm, base somewhat auriculate acroscopically; *rhachis* sulcate. *Sori* extending most of the length of fertile pinnae; *indusium* reddish brown, membranous, entire to erose, c. 0,6 mm broad. Fig. 94: 2 & 3. Fig. 95.

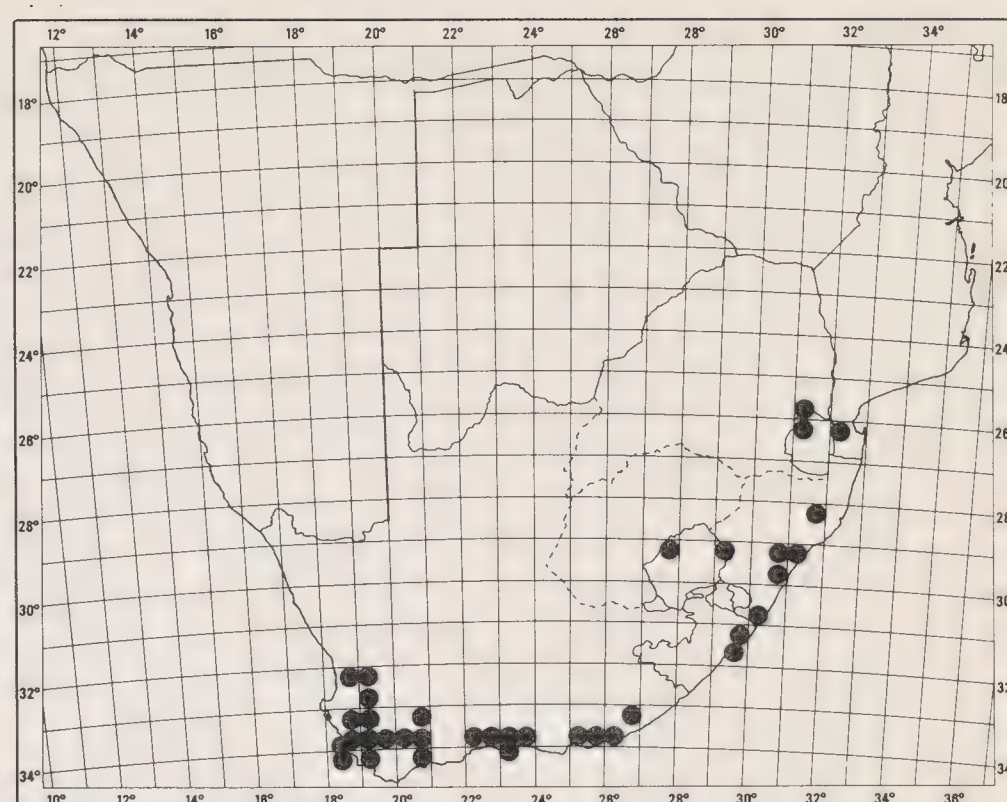
A number of varieties have in the past been ascribed to *B. punctulatum*. These are based on various recognisable stages in trends towards lack of reduction of the fertile lamina and division of the sori into numerous oval sori set at an angle to the costa. However, all three described varieties intergrade and are maintained for the sake of convenience. The number of aberrant fronds that occur in nature, including occasional bipinnatifid laminae and partially fertile fronds points towards genetic instability and research could be done to establish the causes of this instability.

- 1a Fertile lamina reduced; sori parallel to costa:
  - 2a Sori unbroken, set one on either side of costa on each pinna..... (a). var. *punctulatum*
  - 2b Sori on lower pinnae breaking up towards rhachis into small separate oval sori..... (b). var. *atherstonei*
- 1b Fertile lamina not conspicuously reduced; sori set at an angle to costa:
  - 3a All sori oval, separate..... (d). var. *krebsii*
  - 3b Sori set in saw-tooth lines on either side of costa, together with small detached sori..... (c). var. *intermedium*

6 (a). var. **punctulatum**.

W. B. G. Jacobsen, Ferns Sthn Afr. 466, t. 351a (1983).

*Lomaria punctulata* (Swartz) Kunze in Linnaea 10: 507 (1836). *Mesothema punctulata* (Swartz) Presl, Epim. Bot. 113 (1851). *Blechnopteris punctulata* (Swartz) Trevisan in Atti Ist. Veneto 2, 2: 166 (1851). *Struthiopteris punctulata* (Swartz) Trevisan in Atti Ist. Veneto 3, 14: 373 (1869). *Spicanta punctulata* (Swartz) Kuntze, Rev. Gen. 2: 822 (1891).



MAP 237.—*Blechnum punctulatum* var. *punctulatum*

*Blechnum rigidum* Swartz in J. Bot., Gött. 1800, 2: 75 (1801). *Mesothema rigidum* (Swartz) Presl, Epim. Bot. 113 (1851). *Lomaria rigida* (Swartz) Fée, Mém. Fam. Foug. 5: 68 (1852). *Struthiopteris rigida* (Swartz) Trevisan in Atti Ist. Veneto 3, 14: 572 (1869). Type: Herb. Swartz (S, holo.!)—BOL, photo.!).

*Lomaria auriculata* Desv. in Mag. Ges. naturf. Freunde Berl. 5: 330 (1811). Type: Cape of Good Hope, Descrez s.n. (P, holo.—BOL, photo.!).

*Lomaria densa* Kaulf., Enum. Fil. 151 (1824). Type: Cape of Good Hope, Sieber s.n. (HBG, ?iso.—BOL, photo.!).

*Lomaria dregeana* Fée, Mém. Fam. Foug. 10: 9 (1865). *Struthiopteris dregeana* (Fée) Trevisan in Atti Ist. Veneto 3, 14: (1869). Type: Cape of Good Hope, Drège s.n. (Type lost).

Cape Province, Transkei, Natal, Lesotho, Swaziland, Zimbabwe, Malawi and Madagascar. In sheltered rocky habitats and on shaded streambanks, c. 250–2 000 m. Map 237.

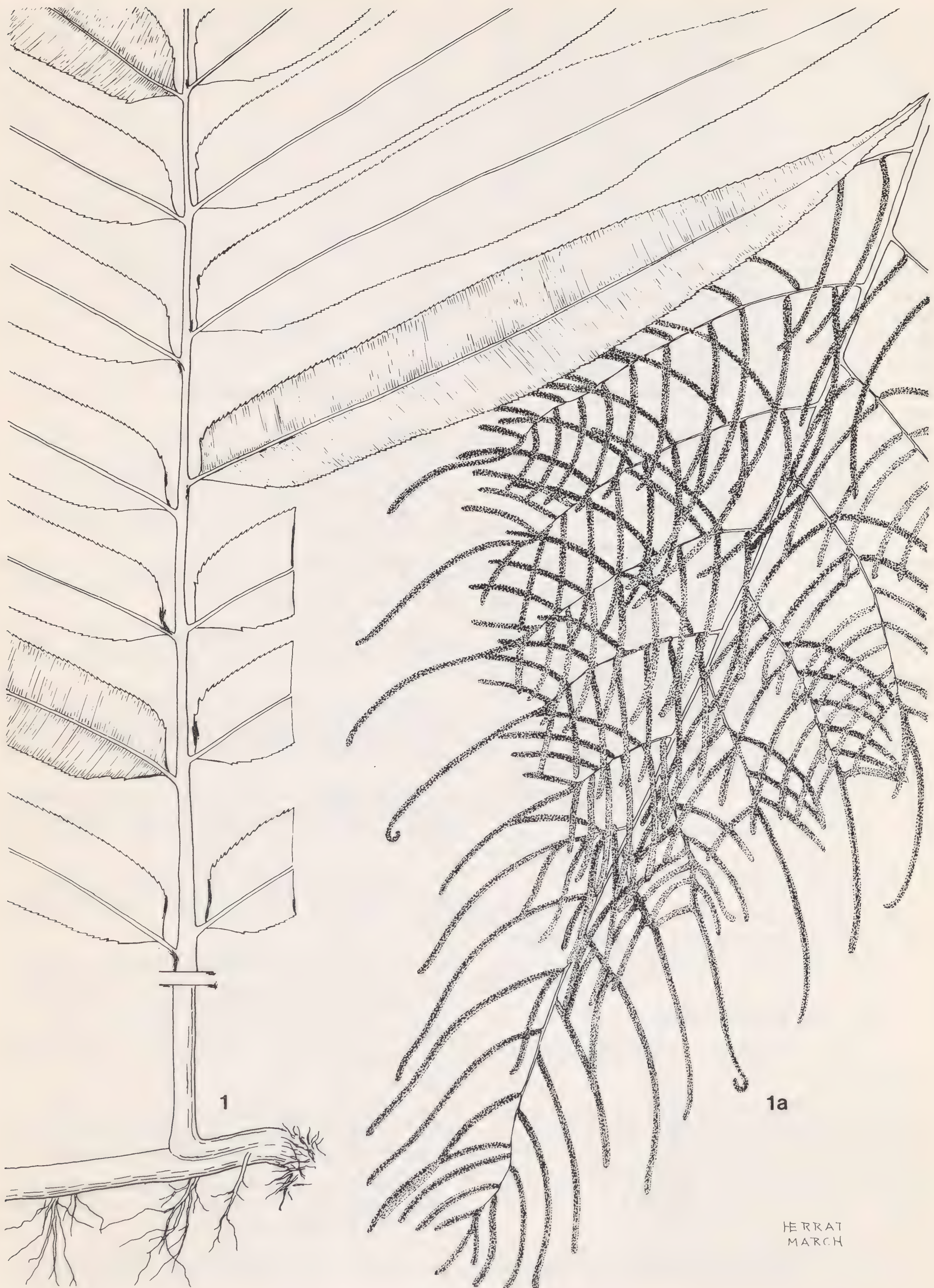
Vouchers: Geldenhuys 396 (BOL); Schelpe 6176 (BOL); Strey 8962 (NH); Ward 2259 (BOL; NPB; NU); Williams 2876, 2877 (NBG).

6 (b). var. **atherstonei** (Pappe & Raws.) Sim, Ferns S. Afr. edn 2: 183, t. 79 (1915); W. B. G. Jacobsen, Ferns Sthn Afr. 467, t. 351b (1983). Type: Cape Province, south-west of Grahamstown, *Atherstone* s.n. (?BM, holo.).

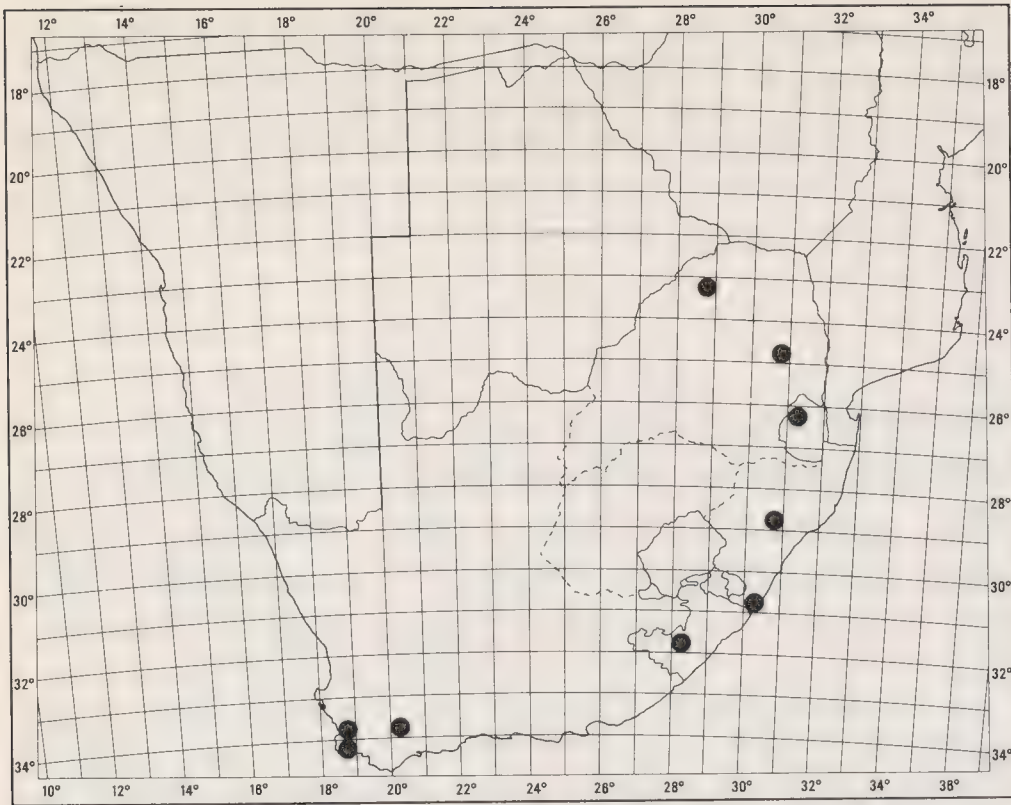
*Blechnum atherstonei* Pappe & Raws., Syn. Fil. Afr. Austr. 16 (1858). *Lomaria punctulata* var. *atherstonei* (Pappe & Raws.) Sim, Ferns S. Afr. edn 1: 120 (1892).

South-western and eastern Cape Province, Transkei, Natal, Swaziland and Transvaal. In forest and drier forest margins and in shade of rocks. Map 238.



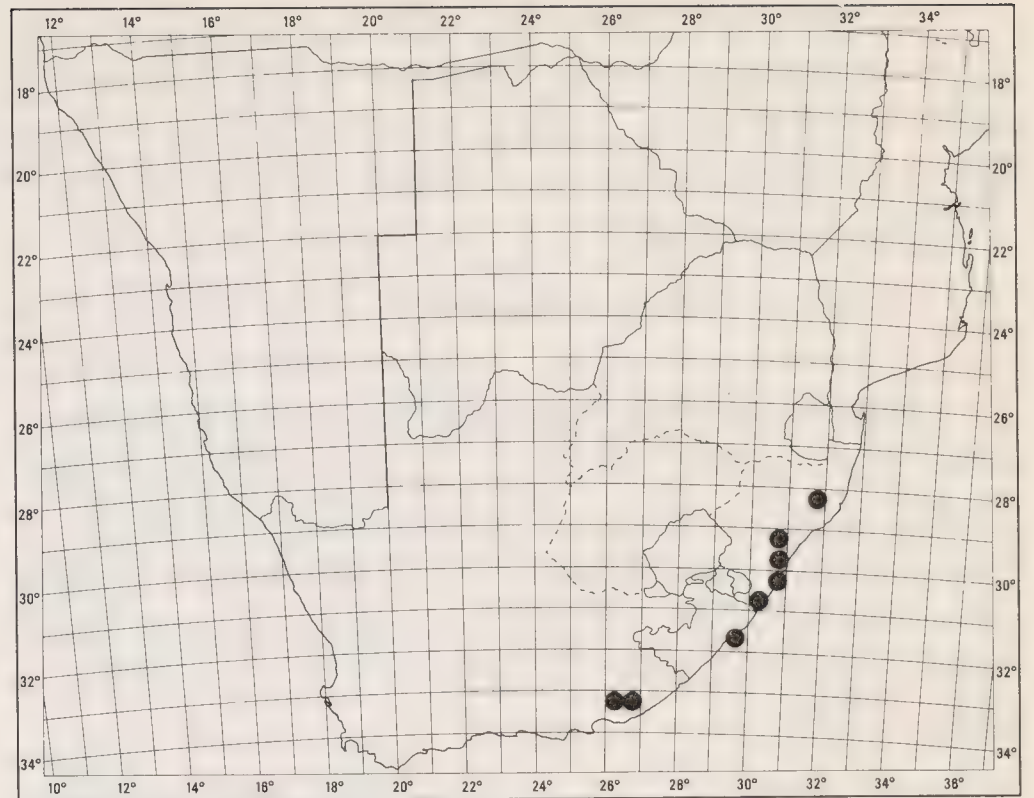






MAP 238.—*Blechnum punctulatum* var. *atherstonei*

Vouchers: *Compton* 26919 (NBG); *Esterhuysen* 26261 (BOL); *Schelpe* 1639 (BOL); 1652 (BOL); *Strey* 5979 (NH; NU).



MAP 240.—*Blechnum punctulatum* var. *krebsii*

types: Cape Province, Grahamstown Kloofs, *Sim* sub TRV 278 (PRE!); Natal, *Buchanan* sub TRV 305 (PRE!).

Eastern Cape Province, Transkei and Natal. In forest and along shady streambanks. Map 239.

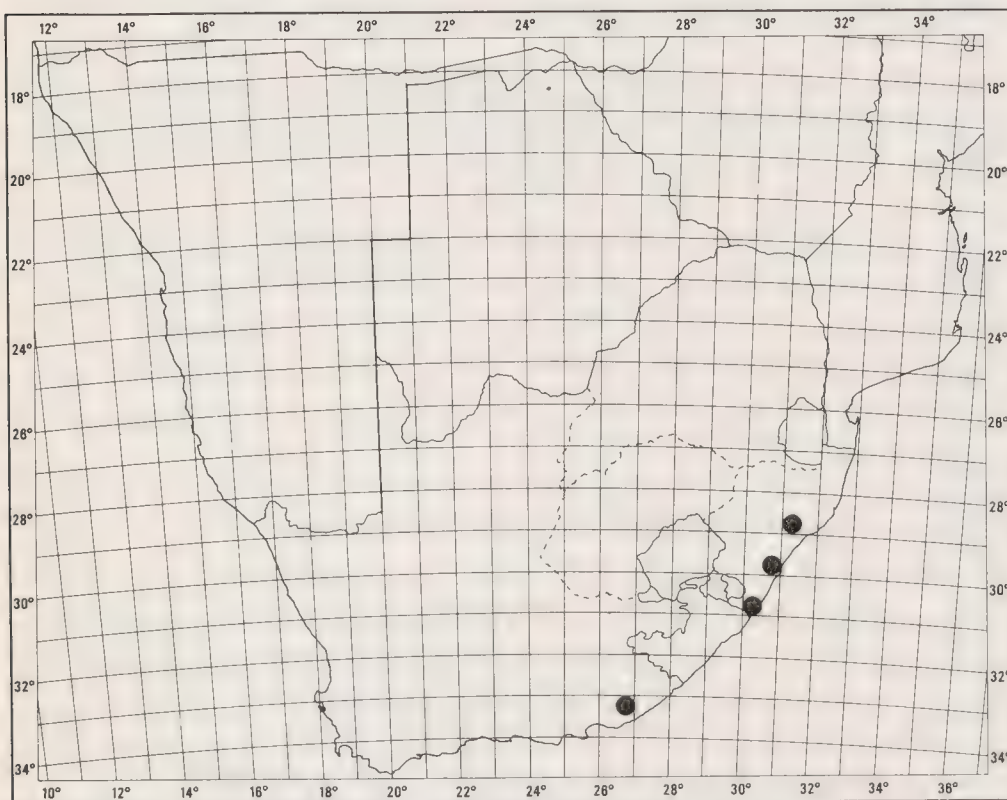
Vouchers: *Basel* 48 (NU); *Rennie* 338 (BOL); *Taylor* 2599 (NBG).

6 (d). var. *krebsii* (*Kunze*) *Sim*, *Ferns S. Afr. edn 2*: 185, t. 81 (1915); *W. B. G. Jacobsen*, *Ferns Sthn Afr.* 468, t. 351d (1983). Type: Cape Province, near Grahamstown, *Krebs* s.n. (B, holo.!).

*Onychium krebsii* *Kunze* in *Linnaea* 10: 504 (1836). *Scolopendrium krebsii* (*Kunze*) *Kunze* in *Linnaea* 18: 118 (1844). *Lomaria punctulata* var. *krebsii* (*Kunze*) *Sim*, *Ferns S. Afr. edn 1*: 122 (1892).

Eastern Cape Province, Transkei and Natal. In moist shady habitats. Map 240.

Vouchers: *Roux* 583 (NBG); 675 (NBG); *Schelpe* 4388 (B; BOL; GH; K; M; MO; PRE; S; US); *Strey* 6905 (NH); *Ward* 2264 (BOL; MO; NPB; NU).



MAP 239.—*Blechnum punctulatum* var. *intermedium*

6 (c). var. *intermedium* *Sim*, *Ferns S. Afr. edn 2*: 184, t. 80 (1915); *W. B. G. Jacobsen*, *Ferns Sthn Afr.* 468, t. 351c (1983). Syn-

## 2. STENOCHLAENA

*Stenochlaena* *J. Sm.* in *J. Bot.*, Gött. 4: 149 (1841); *Engl.*, *Pflanzenw. Afr.* 2: 34 (1908); *Tardieu-Blot* in *Mém. Inst. fr. Afr. noire* 28: 86 (1953); in *Fl. Madag.* 5, 1: 110 (1958); *Alston* in *F.W.T.A. edn 2*, Suppl. 50 (1959); *Tardieu-Blot* in *Fl. Camer.* 3: 353 (1964); *Schelpe* in *F.Z. Pterid.*: 240 (1970); in *C.F.A. Pterid.*: 185 (1977). Lectotype species: *S. scandens* (*Swartz*) *J. Sm.*, nom. illeg. (= *Onoclea scandens* *Swartz*, nom. illeg.; *Polypodium palustre* *Burm. f.*; *S. palustris* (*Burm. f.*) *Bedd.*).

FIG. 96.—1, *Stenochlaena tenuifolia*, part of plant with sterile frond,  $\times 0,6$  (*Ward* 2250); 1a, part of fertile frond,  $\times 0,6$  (*Buchanan* sub BOL 23610).



Large ferns with rhizomes creeping along ground, eventually becoming scandent epiphytes; *rhizome-scales* sparse. *Fronds* remote, dimorphic, pinnate or 2-pinnate; *sterile pinnae* articulate with basal glands, firmly membranous or chartaceous with sharply cartilaginous serrate margins; *fertile pinnae* linear or divided into linear segments, almost entirely covered by sporangia below; *paraphyses* absent.

A small genus of the palaeotropics and palaeosubtropics.

***Stenochlaena tenuifolia* (Desv.) T. Moore** in Gdnrs' Chron. 1856: 193 (1856); Sim, Ferns S. Afr. edn 2: 192, t. 85, 86 (1915); Schelpe in F.Z. Pterid.: 240, t. 69 (1970); W. B. G. Jacobsen, Ferns Sthn Afr. 471, t. 22, 353 (1983). Type: Madagascar, ?*Commerson* (P, holo.!—BOL, photo.!).

*Lomaria tenuifolia* Desv. in Mag. Ges. naturf. Freunde Berl. 5: 326 (1811). *Lomariobotrys tenuifolia* (Desv.) Fée, Mém. Fam. Foug. 5: 46 (1852). *Polybotrya tenuifolia* (Desv.) Kuhn, Fil. Afr. 52 (1868). *Acrostichum tenuifolium* (Desv.) Bak., Syn. Fil. 412 (1868). *Lomariopsis tenuifolia* (Desv.) Christ, Farnkr. 42 (1897).

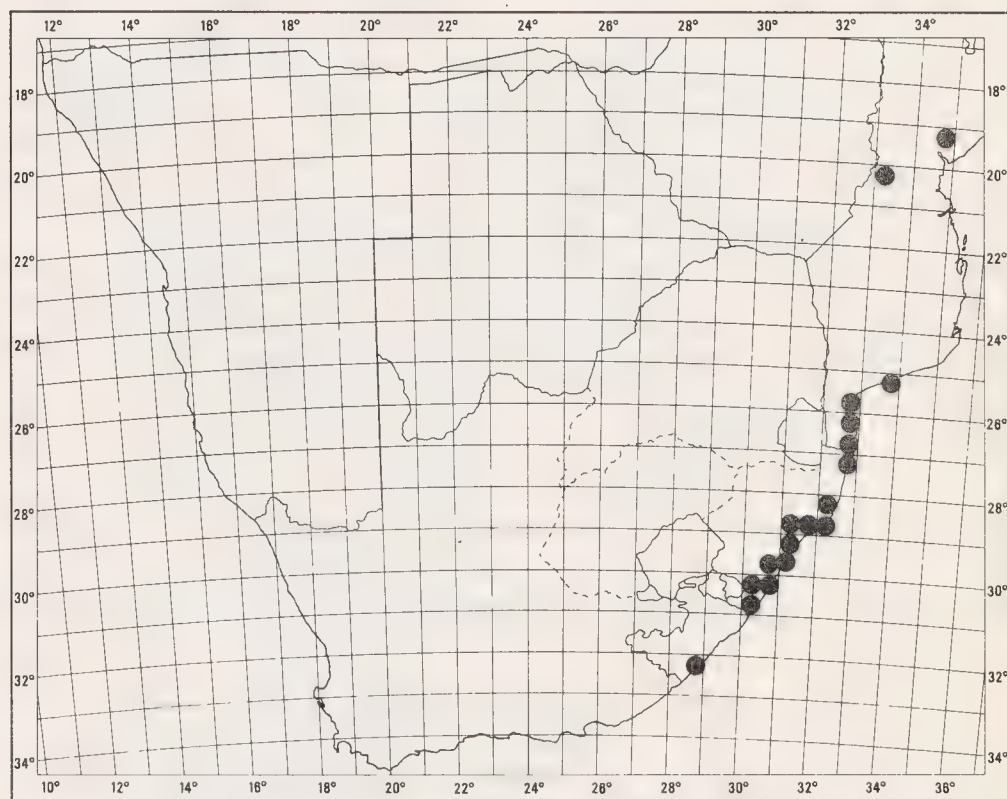
*Lomaria meyeriana* Kunze in Linnaea 10: 509 (1836). *Stenochlaena meyeriana* (Kunze) Presl, Epim. Bot. 166 (1851), reimpr. in Abh. K. Böhm. Ges. Wiss., ser. 5, 6: 526 (1851). *Lomariobotrys meyeriana* (Kunze) Fée, Mém. Fam. Foug. 5: 46 (1852). *Polybotrya meyeriana* (Kunze) Mett., Fil. Hort. Bot. Lips. 24, t. 1 figs 4, 7 (1856), all as *meyeriana*. *Acrostichum meyerianum* (Kunze) Hook., Garden Ferns t. 16 (1862), as *meyeranum*. Type: Transkei, between the Umtentu and Umzimkulu Rivers, Drège s.n. (LZ, holo.†; BM, lecto.!).

Rhizome creeping along ground or ascending trees, up to 20 m long and 10–15 mm in diameter, bearing widely spaced fronds, oblong in outline, and sparsely set with dark brown subulate rhizome-scales up to 5 mm long, becoming glabrous with age. *Stipe* pale brown, sulcate, glabrous, 0,3–0,5 m long. *Sterile fronds* erect, pinnate; *lamina* 0,8–1,5 × 0,25–0,4 m, somewhat reduced basally; *pinnae* linear, glabrous, petiolate, firmly membranous, acute, acuminate, up to 270 × 30 mm, base unequally cuneate, margin minutely cartilaginous-serrate. *Fertile fronds* erect, 2-pinnate or

rarely pinnate; *lamina* 0,6–1,4 × 0,2–0,4 m, somewhat reduced basally; *pinnae* up to 0,25 m long, pinnately divided into narrowly linear segments adnate to rhachis or petiolate, glabrous above, up to 80 × 2 mm. Fig. 96.

Transkei, Natal, Mozambique, Tanzania, Kenya, Madagascar, Pemba, Zanzibar, Mafia Island, Galega Island, Mauritius and Comoro Islands. Frequently found in the coastal forests of Natal and on the coastal plain of southern Mozambique, both on the forest floor and as a scandent epiphyte in masses covering large trees, especially on less shaded tree boles. *S. tenuifolia* only produces fertile fronds in high light intensities; thus in closed forest they will only be found at canopy level. It is known from near sea level to about 650 m altitude in swamp forests. Map 241.

Vouchers: *Bowker* sub *MacOwan* H.A.A. 1596 (K; SAM; UPS); *Medley Wood* s.n. (BOL; NH; PRE; SAM); *Thode* A.1545 (K; NH; PRE).



MAP 241.—*Stenochlaena tenuifolia*



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\* An asterisk signifies exotic species which are not naturalized; synonyms are in italics.



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